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Castings Thrive on Competition

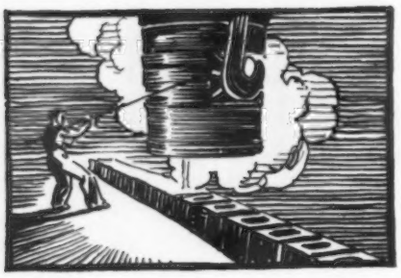
IN accordance with long established custom, this particular issue of THE IRON AGE, which is published just prior to the convention of the American Foundrymen's Association, is essentially a "Foundry" number.

The Review of the Industry, which appears on the pages immediately following, shows conclusively that the ancient and honorable art of casting has actually gained through the experiences of depression times.

It has gained because it has responded to competition; the competition of other materials. And in responding to the spur of this competition, the art of casting has made faster progress in the past few years than it made in many previous decades.

A few years ago, for example, one who had forecast heat treatable cast iron or alloy steel castings with ultimate strengths approaching 80,000 to 150,000 lb. per sq. in. respectively would indeed have been considered an impractical dreamer. Today, these accomplishments, thanks to the spur of competition, are taken-for-granted realities.

Competition will never relegate castings to a minor position in the field of metal-working materials. They are here to stay. Occasionally they may have to give ground for specific uses where newer materials are proven to be superior. But if they continue to develop new qualities as rapidly as they have during the past few years, they are likely to find two new applications for use for every one that they wisely relinquish.



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MANY new uses for castings have been developed during the past year. The casting industry, in fact, as a whole may be said to be in a better comparative position in the broad field of machine construction than it was in 1930 or 1931. C. H. Champlain, general works manager of Westinghouse Electric & Mfg. Co., for example, reports progress in the foundry industry despite adverse commercial conditions. In many cases, he says, castings have demonstrated a new ability to compete with stampings and fabricated parts.

The heat treatment of iron castings, particularly those containing alloys, has been widely extended. Practically all Diesel engine castings, including cylinders, liners, cylinder heads and pistons, are now artificially aged by thermal treatment. This usually falls within the temperature range 800 deg. Fahr. to 1100 deg. Fahr. In contrast, some foundry metallurgists have taken steps to avoid the necessity of thermal treatment. At least one manufacturer of automobile cylinder blocks, and several machine tool builders, have added 1.5 to 2 per cent nickel to their castings, to reduce stresses and thus avoid the necessity of artificial aging. Molybdenum also has been employed to some extent for this same purpose.

For extremely high physical properties more elaborate heat treatment is now used by the most progressive foundries. This includes quenching and drawing after the methods familiar with forgings and drawn steel. Many of the new alloy castings have been developed especially for their heat treatable properties.

A marked increase in the use of electric furnaces and permanent molds for gray iron castings is perhaps the most significant feature of the past year. The use of a permanent mold casting machine in the mass production of cream separator parts is described elsewhere in this issue. Fully automatic pressure casting of steels and alloy steels has been accomplished in a machine designed by A. W. Morris, consulting engineer, Springfield, Mass., and much other important progress in this same direction has been made in research laboratories and some commercial applications are imminent.

One of the outstanding advances in the foundry industry during the last two or three years has been a closer adaptation of castings and materials to the specific use intended. Prior to 1929 the fact that a casting was stronger than needed for a certain purpose was often ignored, as engineers felt that this was an error in the right direction and that any additional expense thus incurred would be negligible. The close scrutiny of detail engendered by the depression has corrected this laxness with the result that the selection of materials and of fabricating operations have been brought into close line with specific needs. One detail of interest in this connection concerns the finish of castings. Heretofore, requirements for mold surfaces were generally uniform. A molder paid as much attention to one surface of his mold as he did to another. During the past year the practice of specifying the various grades of finish of castings has extended to the molder, with an appreciable saving of his time. Thus a casting which is to form an interior part of a mechanism may be allowed considerable leeway in the finish of surfaces which are not to be machined. Advance in metallurgical technique has made it possible to give one part of a casting special qualities without affecting the remainder of the casting and at a saving over the previous requirement of high physical values for the entire casting. An example of this is the surface aluminizing of gray iron to make it nitridable.

The lower costs of some raw materials, particularly of non-ferrous metals, have brought changes in commercial applications of alloys, and the need for reduced production costs has caused many developments in auxiliary equipment and materials. One interesting example is the development of emulsified core oil by the DeLaval Separator Co., Poughkeepsie, N. Y. By using about half core oil and half water, both of which are run through its centrifugal emulsifier, this company produces a binder for which many advantages are claimed over the original core oil, in addition to a marked saving in cost.

Engineers are increasing both pressure and temperature of castings to limits hardly dreamed of a few years ago. Modifications of molding technique have reduced costs and improved quality in many cases. Thus one foundryman reports that skin dried molds are replacing dry sand molds and that castings fully as sound as with dry sand molds are produced in this manner.

Heat Treatable Gray Iron Castings

OUTSTANDING in the entire foundry field is the commercial production of high strength iron which may be designated as heat treatable cast iron. This material fills a long-felt want in that it is intermediate between cast iron and steel. According to Carl H. Morken, foundry engineer of the Detroit Electric Furnace Co., there are three general groups of heat treatable cast irons commercially available today. The first group has a yield point of approximately 45,000 lb. per sq. in., an ultimate tensile strength of about 70,000 lb. per sq. in. and an elongation of 13 per cent. The second and third groups sacrifice ductility to secure greater tensile strength. A yield point of about 50,000 lb., a tensile strength of about 70,000 lb., together with an elongation of 7 per cent, characterize the second group. In the third group a yield point of 70,000 lb. and an ultimate tensile strength of 100,000 lb. are attained with an elongation of about 4 per cent. These irons are produced in electric furnaces and commercial success depends primarily upon accurate control of the composition and thorough mixing during superheating. The heat treatment varies with other characteristics but in general is a short cycle completed in less than 24 hr. It consists in some cases of a simple anneal. In other cases the anneal is combined with a quench either in oil or air, and in still other cases the quench is followed by a draw.

Some foundries have successfully used alloys in this type of iron. Comparatively small additions of molybdenum increase the strength from 10 per cent to 15 per cent above that of

During the Depression

PERMANENT molds for steel and alloy castings, fully automatic die casting operations for gray iron, new heat treatable ferrous and non-ferrous castings: these are some of the important developments of the year in the foundry industry. The following review gives a brief description of some of the new materials and processes, and presents pertinent comment from many authorities.

the unalloyed iron. Such an alloy iron has excellent engineering properties including high fatigue resistance, good stress dampening, rigidity and shock resistance. Mr. Morken gives some of the present applications for this material as gear housings, cam shafts, crank shafts, manhole covers, suspension brackets, golf club heads and differential carriers.

G. E. Uses Electric Furnace Iron

"For nearly a year we have been producing our gray iron castings at Schenectady from electric furnace iron," states J. M. Sampson, foundry superintendent, General Electric Co. Mr. Sampson finds that due to the low cost of raw materials, including cast iron turnings and silicon sheet steel scrap, the cost at the spout has compared favorably with cupola operation. He states further: "The product, for equal machinability, shows greater strength, or for equal strength it shows greater machinability. Many castings that formerly showed certain losses when made from cupola iron are now made with fewer rejections from electric furnace iron. We also experience closer control of chemical analyses and physical properties. The electric furnace iron, for the same Brinell hardness, is more readily machined."

Cast iron has taken on new life recently, according to Walter M. Saunders, consulting chemist, Providence, R. I., who gives some of the more important developments in heat treating, simple annealing to increase machinability and wider application through a better understanding of its advantages. The dampening effect to vibration, together with increased strength, has led to the successful production of automobile crank shafts out of heat treated gray iron castings. Another new application is found in the range oil burner, a product developed during the depression and now enjoying heavy sales in rural districts because it converts a standard coal or wood range into an oil stove. The principal parts of the burner are thin gray iron castings of fine grain structure. Mr. Saunders states that in his experience he has found that where a strong iron is demanded, the purchaser usually is able to pay the cost of alloying and still find an economy in the use of an iron casting. He cites several cases where nitridable cast iron containing aluminum has come into successful production during the year.

Centrifugal Casting Progress

Notable progress has been made during the past year in the centrifugal casting of cast iron. This has been due in part to better temperature control all the way from the cupola to the storage yard. The installation of from 10-ton to 15-ton capacity forehearths into which the cupola constantly discharges has meant a better and more even distribution of the chemical constituents of cast iron. S. E. Linderman, U. S. Pipe and Foundry Co., states: "Further improved and more closely controlled annealing temperatures made possible by refinements in furnace construction have added their contribution and today all of our tests show that we are turning out not only a more uniform structure in the pipe wall but also that we have increased the impact resistance without reducing tensile or bursting strength."

Larger centrifugal castings have been made and new appliances designed to include special mechanical joints on pipe sections. One manufacturer is now centrifugally casting pipe 24 in. in diameter and 18 ft. long. A combination of a centrifugal casting with a nitridable surface has been developed. The principle involved is to first pour into the revolving mold a thin layer of aluminum alloy. After this the molten iron is poured and as it is heavier the aluminum tends to work back toward the center and thus penetrates the iron, producing an excellent nitridable surface with a core of unalloyed gray iron.

Gray Iron Symposium

A symposium on gray iron which will be part of the annual meeting of the American Foundrymen's Association this month at Chicago, will include a detailed description of the influences of the various alloying elements. Thus small amounts of manganese up to 1 per cent are said to have little effect on iron, if the silicon content is ample. Above 1 per cent, manganese tends to combine with the sulphur present, forming a manganese sulphide and in general is beneficial as a deoxidizer and scavenger. Nickel additions influence machinability, texture, hardness, density and heat corrosion resisting properties. They often are used with other alloying elements such as chromium or molybdenum. Some typical examples of nickel cast iron are given in Table 1.

Chromium increases heat resistance, hardness, and strength up to certain limits. It is essentially a carbide former in contradistinction to graphite forming elements such as silicon and nickel. A few examples of chromium cast iron are shown in Table 2. The usual ratio of nickel to chromium for additions to gray iron is 2½ to 1. Commercial applications of nickel-chromium cast irons are found where greater hardness and wear resistance are needed in a machinable iron.

The practice of annealing of iron castings has widened greatly in the

TABLE 1—Typical Examples* of Nickel Cast Iron Chemical Analysis

Casting	Per Cent T. C.	Si.	Mn.	Ni.	Brinell Hardness	Per Cent Steel in Charge
Auto cylinders	3.25	1.80	0.65	1.25	180**	20
High strength iron	2.75	2.25	0.80	1.00	240	90
Locomotive cylinders	3.00	1.10	0.85	1.25	200	50
Heavy machine tool beds	3.20	1.00	0.80	1.00	200	65
Pump bodies	3.30	1.50	0.65	1.25	200	30
Light gears	3.30	1.50	0.60	1.25	200	30
Heavy gears	3.00	1.00	0.75	2.00	220	50
Automobile pistons	3.40	2.50	0.65	1.00	180	15
Heavy crusher frame	2.75	1.75	0.80	2.00	230	90
Elevator shears	3.00	1.00	0.80	1.25	220	50

*These typical examples should not be used as specifications.
**Hardness in bore.

TABLE 2—Typical Analyses* of Applications of Chromium Cast Iron

Casting	Per Cent Total Carbon	Silicon	Chromium
Annealing boxes	1.80	1.25	26.0
Chills	3.10	2.00	1.0
Crusher jaws and rolls	2.00	1.00	25.0
Furnace castings	2.25	2.00	15.0
Glass molds	3.25	2.00	0.60
Grinding balls and liners	up to 3.5	up to 2.0	3.0
Heat resistance castings:			
(a) For temperatures up to 1300 deg. F. (such as fire pots and stove grates)	up to 3.5	2.25	1.25
(b) For temperatures to 1800 deg. F.	up to 2.5	up to 2.50	15 to 30
Gears	3.25	1.75	0.75

*These compositions should not be used for specifications.

last year or two, according to F. B. Coyle, International Nickel Co., in a paper which is to be presented this month before the Institute of British Foundrymen. He classifies the present annealing practice under four headings:

1. Annealing gray iron for softness to facilitate machining. This is at 1400 deg. F. or above. Where maximum machinability is the sole factor, the addition of alloying elements is usually detrimental as they increase hardness.
2. Annealing of martensitic white iron to facilitate machining. This is done between 1100 deg. F. and 1200 deg. F.
3. Annealing white or alloy cast iron to impart toughness and resistance to impact. This is done between 1600 deg. F. and 1700 deg. F.
4. Partial malleabilizing of alloy white cast iron in order to obtain increased tensile strength and to promote ductility.

Concerning heat treatment for hardness, Mr. Coyle says: "It is possible to consistently obtain Brinell hardness above 500 with nickel and nickel-chromium irons of suitable total carbon and silicon content by quenching in oil from above the critical range."

The use of small additions of nickel in the general run of iron castings has been extended. One manufacturer recommends adding 0.75 per cent to 1.00 per cent nickel for light castings and 1.00 per cent to 2.00 per cent nickel for heavy castings.

New Alloy Castings Appear

PERHAPS 80 per cent of the recent developments in the foundry industry has been in the field of alloy castings. The term "alloy" is broad and is used by some engineers to include almost any casting containing nickel, molybdenum, chromium, or similar metals. Here it is to be restricted to ferrous castings having a sufficiently high proportion of alloying metals to take them out of the strict carbon steel classification. The manufacturers of Z-Metal classify that metal under alloy castings, but identify it as a temper carbon steel. This particular metal is one of the most recent developments and although classified as an alloy or a steel casting, it originated in the malleable industry and is produced in a manner somewhat similar to that used with ordinary malleable castings. The composition of the white iron and the nature of the annealing cycles are varied. The Industrial Furnace Corpn., Buffalo, licensor of Z-Metals, states that this product has been accepted for use at elevated temperature where resistance to wear and abrasion are important requirements. It has been used for gears, chains and sprockets, road machinery and automotive parts, also for pressure castings. This corporation is withholding descriptive details for a release sometime in July or August.

The Cooper Alloy Foundry Co., Elizabeth, N. J., reports improved melting practice in connection with stainless steels which results in new properties. This company claims a more uniform distribution of carbides, with increased corrosion resistance. In the case of 18-8 alloy castings, it claims a more austenitic metal than has been heretofore possible, and a structure which retards carbide precipitation.

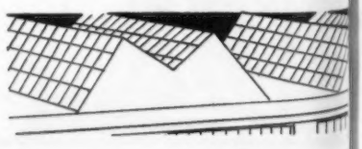
The Lebanon Steel Foundry, Lebanon, Pa., has developed new castings for the oil industry and, in particular, an alloy containing 4.50 per cent to 6.50 per cent chromium, with approximately 0.50 per cent molybdenum. Castings of this alloy are said to have unusually high physical properties and low creep values at high temperatures. Parts for heavy duty oil pumps, high pressure valves, and for oil still fittings are being successfully made of this chrome-molybdenum alloy. The company engineers state that in their opinion the trend at the present time is toward the use of 18 chromium 8 nickel or even higher chromium-nickel alloys, rather than toward the straight chromium analyses. This they state is because of the higher ductility values, particularly where high stresses and shock loads are encountered.

Makes Cast Die Blocks

The Hunt-Spiller Mfg. Corpn., Boston, is successfully casting die blocks of an Invar type iron. The dies operate at elevated temperatures and requirements are for an iron of low coefficient of expansion as well as resistance to corrosion. The analysis is total carbon 2.40 per cent, silicon 1.50 per cent, manganese 0.30 per cent, nickel 38.00 per cent, chromium 4.00 per cent, with sulphur and phosphorus low. The castings have a tensile strength of 30,000 lb. per sq. in. and a Brinell hardness of 140. A 1¼-in. bar on 12-in. supports and loaded at the center with 4200 lb. showed a deflection of 0.250 in.

A new Monel metal heat treatable casting has been developed during the year. This has a slightly altered chemical analysis with higher silicon content and better machining properties. The manufacturers claim that it can be annealed for machining and then heat treated to a Brinell hardness of 350 or more. The metal as cast has a hardness of about 300 and in the annealed state is down to 250.

Some of the less expensive alloys containing up to 35 per cent chromium have found many applications for heat and corrosion resistance. These are of the low carbon variety usually containing less than 2 per cent carbon. One foundry is now producing a substantial tonnage of beer fixtures of this material, according to Mr. Morken of the Detroit Electric Furnace Co. Other foundries are using



similar material for general food containers.

A New Ductile Alloy

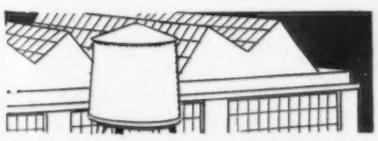
One Mid-west foundry has developed a manganese nickel steel casting which when water-quenched develops some remarkable properties. This alloy contains approximately 0.30 carbon, 1.07 manganese, 0.32 silicon, and 0.85 nickel, and the average of 7 heats after water quenching gives a yield point of 61,607 lb., a tensile strength of 92,928 lb., elongation of 28 per cent, a reduction of area of 57 per cent, and a Charpy impact rating of 28 per cent.

The rapid development of lower priced alloys is an important feature of the past year in the alloy castings field. In addition to this, many new high strength and high alloy steels have been developed. The Penn Steel Casting Co., Chester, Pa., has developed a new nickel-chrome-molybdenum steel for Government dredges. This material, with a composition approximately as follows: manganese 0.60 to 0.80, nickel 3.00 to 3.50, chromium 1.00 to 1.50, molybdenum 0.25 to 0.35, silicon 0.20 to 0.40, is an air hardening steel which will show a Brinell hardness of about 350, together with a tensile strength close to 150,000 lb. per sq. in. The Chapman Valve Mfg. Co., Indian Orchard, Mass., has produced a new chrome-tungsten steel for special applications. The Union Steel Casting Co., Pittsburgh, reports a manganese-vanadium steel with a tensile strength of 90,000 lb. per sq. in. and an elongation of 22 per cent. This is a heat treatable alloy.

Steel Foundry Activity

VALUABLE experience was gained during the last twelve months in the production of low alloy steel castings, according to R. A. Bull, director, Electric Steel Founders' Research Group. This caused betterment in melting and heat-treating procedures and in vital shop practices that are distinct from furnace operations. On the other hand, the keen interest of many consumers in high alloy steels in rolled and wrought form has been followed by encouraging attention to similar metals on the part of those who require castings. This has increased substantially the number of foundries producing such materials, even though satisfactory casting manufacture, in the case of many alloy steels, calls for special shop technique, due to problems of fluidity, shrinkage, and temperature-susceptibility.

A committee of the American Foundrymen's Assn. is evolving for presentation to steel casting makers, a classification scheme based on chemical composition and intended to eliminate confusion among buyers. This certainly is a step in the right direction. A sectional committee of the American Society for Testing Materials recently developed a set of purchase requirements for eight grades of alloy steel castings for structural purposes. It is anticipated that the testing society will adopt these specifications as tentative at its forthcoming meeting. If such action is taken, the result will be physical test requirements that will indicate what may be expected under many severe service conditions. The committee agreement already reached is evidence of progress, because it required considerable experience to enable foundrymen to determine what they could guarantee, when manufacturing the variety of steels represented (by physical properties only) in the specifications.



Despite discouraging conditions of output, the industry has advanced along general lines of foundry practice. Much of this improvement has been necessitated by economic factors, but the most efficient steel foundries have not permitted cost considerations to retard progress in respect to quality.

Clean Steel for Strength

"We find that the steel castings industry has achieved appreciably higher physical properties during the year, independent of the new alloys," states A. T. McKee, production manager, Strong Steel Foundry Co., Buffalo. "This means extremely clean steel, accurate analyses, close heat control, and better heat treatment."

H. E. Doerr, Scullin Steel Co., St. Louis, in reviewing the situation among steel foundries, says: "From a quality standpoint, many steel foundries have benefited by the depression because during the days of high-speed production they could not give proper attention to experimental work and a study of details leading to improved quality. I think that many of the factors entering into the successful production of steel castings have been more thoroughly investigated during the last year or two than during any time in the past."

The increase in manganese and silicon content in steel castings has received wide consideration. Where large heats are poured, and many castings, it is imperative that the manganese and silicon be high at the beginning, otherwise the tendency in the latter part of the heat will be for the castings to have blow holes as the manganese and silicon oxidize.

Better Castings Produced Under Present-Day Conditions

E. H. Ballard, of the General Electric Co., says: "I think it is safe to state that the average steel foundry today is in a position to produce castings in both carbon and alloy steels with decidedly higher physical properties than ever before." This has been made possible by the study of various metals and their effect as additions and by more intensive application of heat treatment to castings. Today heat treating of steel castings is quite general in any up-to-date foundry. Better application of molding sands to different classes of work is another feature of the recent progress.

The fact that a unique design for an unusual product may escape the effect of the depression is shown by the experience of the Chicago Steel Foundry Co. in its production of a cast steel screw for use in both domestic and industrial stokers. David Evans, president of this company, states: "For the first four months of 1933 the increase in demand for this product was almost 100 per cent over the same period in 1932, and during the first week in May of this year we

produced more cast steel screws than we produced during the entire month of May in 1932. We have successfully adapted this same type of casting for use as screw conveyors in the cement industry."

Seek Higher Malleable Specifications

THE malleable iron industry emerges from the depression with a better reputation for uniformity and soundness of castings than ever before, according to Enrique Touceda, consulting engineer of the Malleable Iron Research Institute, Cleveland. The substitution of malleable for competitive products has increased during the past year, he states, and adds that engineers have turned to malleable in some cases because such castings of complicated design stand up under severe abuse in service. In other cases they seek the excellent machining properties of malleable iron.

A number of technical societies have sponsored the classification and designation of surface qualities of malleable iron and recently some engineering society committees have suggested stepping up standard specifications covering malleable castings and it is expected that this recommendation will be approved at the meeting of the societies this month. The need for such action is clearly shown from the fact that with a membership of 35 plants in the Malleable Iron Research Institute, 18 qualified under the higher specification and 8 of these plants could have qualified under a still more severe specification, according to Dr. Touceda. The trend in the malleable industry is toward the use of electrically heated annealing ovens and shorter annealing cycles. Many foundries are regularly operating on two anneal heats per week.

Alloy additions in malleable castings have been disappointing in many cases. However, a small addition of molybdenum has been successfully used by some plants to increase both ultimate strength and yield point. Some experimenters have carried through tests of mixtures of abnormally high silicon and low carbon but the results are not available although stated in general to be successful.

The past year in the malleable field has seen the development of higher physical properties and lower costs. The lower costs have been achieved in part by shortening the annealing cycles and this in turn has been accomplished by using better control of temperature and by annealing at higher temperatures. Some malleable foundrymen have altered the composition of the white iron with considerable success. One metallurgist reports that a composition with lower carbon and increased manganese makes it possible to anneal at considerably higher temperatures. Experimental work with the so-called shock anneal has been carried on by several investigators with promising prospects. The cycle in this case consists essentially of one or more quenches at high temperature during the anneal.

Some of the new castings are known as semi-malleable and have high tensile strength and reduced elongation. These irons usually run lower in total carbon but higher in silicon than malleable irons and are more amenable to quick graphitization.

New Aluminum Alloys

ALTHOUGH the fields of application are far from explored, 1932 developments brought to aluminum alloy castings a place among engineering materials, even more important than heretofore. Of particular interest is the high purity aluminum-magnesium group. A new 4 per cent magnesium alloy, because of its corrosion and tarnish resistance, machinability, and mechanical properties, is proving satisfactory for dairy equipment and other food handling appliances. A new 10 per cent magnesium alloy in the heat treated condition, possesses greater strength and impact resistance than any other cast aluminum alloy with which we are familiar. The mechanical properties are such as to permit satisfactory substitution for cast steel with a maximum of weight saving. A promising use for this alloy is in railroad car construction for truck frames, bolsters, and car body parts.

Heat treated aluminum-silicon alloys, although developed prior to 1932, have come into considerably more commercial importance during the past year. They have in general better corrosion resistance and casting properties as well as lower specific gravity, than have the older aluminum-copper alloys. A 5 per cent silicon alloy with controlled amounts of copper and magnesium, possesses satisfactory properties for water-cooled cylinder heads for aircraft and automotive engines, and new uses for this alloy are developing in the industrial internal combustion engine field, particularly for crank cases, water jackets, and manifolds.

A 7 per cent silicon alloy in the heat treated condition, in addition to possessing mechanical properties comparable with those of some heat treated aluminum-copper alloys, also possesses certain advantageous casting characteristics suitable for the production of intricate pressure tight castings. Automotive and Diesel engine crank cases, pneumatic tool and air compressor parts, engine bases, valves, and fittings are a few of the uses of this alloy.

For automotive pistons the use of a 13 per cent silicon alloy with controlled amounts of magnesium and nickel, has grown steadily. Because of the lower coefficient of expansion and combination of other physical and mechanical properties desired for pistons, this alloy during the past year has replaced some of the older aluminum-copper alloys, in the case of several automotive engines.

New Applications of Cast Aluminum

Certain of the newer applications of cast aluminum products resulting from intensive experimental development are worthy of note. Diesel engine parts of different aluminum alloys are proving highly satisfactory. What we believe is the largest heat treated aluminum casting made to date was completed during the past year. It is a Diesel engine crank case and cylinder block weighing 7500 lb. The advantages of the T-slot design of piston have become more generally recognized and this design in cast aluminum alloys has been adopted by a number of automotive, truck, and marine engine builders. Aluminum cylinder heads for automotive engines, permitting increased compression ratio, lower fuel consumption, and greater horse-power per motor have also been adopted as standard equipment by a number of automobile builders.

Recent large-scale examples of the architectural use of case aluminum alloys in various colors and finishes will be found in the Empire State Building of New York, finished early in 1932, and in the more recent Rockefeller Center development, also of New York.

No More "Ringing Door Bells" In This Foundry's Sales

MANY changes have occurred in industry during the depression, but none of more far-reaching effect than in the foundry trade. Long accepted methods of producing iron have given way to new processes because of technological advances and of shifting markets. The foundryman who was content to sit back and watch his company do things as they were done 10 years ago has discovered his business slowly vanishing. Unless he elected to do something to save the situation, his cause was lost.

This is precisely the situation which recently confronted the D. J. Ryan Foundry Co., Ecorse, Mich. Having built up a reputation as a manufacturer of automotive cylinder castings and other automotive parts, this company found that the trend of events in the automobile industry was undermining the foundation of its business. Motor car makers were equipping their own foundries to handle the class of work which for years had been done by outside suppliers. This development alone meant that the company was cut off from a substantial share of business which it formerly had enjoyed.

Here then was a foundry with specialized equipment, but no use for it. After making a survey of conditions, the management decided that two courses were open—to re-equip the foundry for the extremely economical production of all classes of gray iron work or to install a system for making a superior product to be sold at a premium. Adoption of the first course meant severe competition on a price basis for the relatively small volume of existing business. The latter course, embracing a new conception of selling castings and new manufacturing processes, was given the preference.

"Custom Made" Iron

Two electric rocking furnaces, one of 3000-lb. capacity and the other of 500-lb. capacity, were installed, and a chemical and metallographic laboratory set up. The problem of selling castings was approached from a new angle, that of making the best product obtainable for those willing to pay for it. This involved manufacture of custom-made iron to fit the particular job. Instead of turning out one grade and kind of iron, or perhaps two, it became necessary to make many grades and to employ many types of alloys. Special consideration had to be given each order so that the castings delivered to customers would be as nearly as possible ideal for the purpose intended.

Today the company has a number of grades of iron, each of which can be modified to suit a special requirement, to take care of the needs of its customers. These grades are approximately as follows: cupola cylinder iron, 4 per cent steel addition for medium heavy work, 7 per cent steel addition for heavy work and heavy round stock, soft iron for light work, pot iron for tool and die pots, malleable white iron heat-treated, hard iron to resist wear and abrasion, and high chrome iron for rustless applications.

WHEN the market for automotive cylinder castings began to disappear, the D. J. Ryan Foundry Co., Ecorse, Mich., installed electric furnaces, set up a chemical and metallographic laboratory and started to sell castings to meet a specified purpose rather than to ring door bells soliciting gray iron orders. Among its many products today it is consistently producing an electric furnace iron with tensile strength of 100,000 lb. and elongation of 5 per cent. Through use of the electric furnace and development of new melting practices, it has reduced the annealing time for malleable castings to 15 hr.

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Particular attention has been given to heat and corrosion resisting castings, especially to equipment for handling molten metal. For instance melting pots for aluminum are being made showing over twice the life of pots cast from ordinary cupola iron. These pots are of high-carbon, low-silicon gray iron with a dense grain structure. For the production of corrosion-resisting castings a metal is used containing as much as 25 to 30 per cent of alloys. A thoroughly homogeneous casting is secured as a result of melting the alloys with the charge instead of adding them in the ladle.

Tensile Strengths From 55,000 to 100,000

A high-strength, heat-treated iron with a tensile strength of about 100,000 lb. and elongation of 5 per cent is being made in the electric furnaces. Low in carbon, this iron is heat treated to secure a sorbitic structure. The tensile strength of most malleable castings is about 55,000 lb. with an elongation of 20 per cent. Somewhere between these two limits of 55,000 to 100,000 lb. tensile strength and 5 to 20 per cent elongation is an analysis which will fit most malleable jobs. It is this analysis, varying with the individual order, which the Ryan foundry is meeting.

The long-accepted annealing cycle for malleable castings is seven days. Through the use of the electric furnace and the development of new melting practices this has been reduced to 15 hr. In other words, there are several factors which affect the length and effectiveness of the annealing process. One is the melting temperature, which is around 2950 deg. F. in the electric furnace; another is the control of the carbon and silicon to within 0.05 per cent; a third is the absence of impurities due to the electric melting process, the sulphur and phosphorus being held unusually low.

With the annealing cycle cut to about one-eighth its former time, it is now possible to deliver malleable castings on the third morning after an order is received. So far as the range of annealing temperatures is concerned, the cycle is approximately the same as before. The chief difference is that the cycle has been shortened, although each part of the cycle is in the same proportion to the others as it was previously. As the annealing time is shortened, greater strength is secured in the casting.

Apart from the technical accomplishments of the Ryan foundry, its success in expanding its business in recent months is due in large measure

(Concluded on Advertising Page 14)

Permanent Molds in Manufacturing C

THE principal parts in the construction of a modern DeLaval cream separator are close-grained gray iron castings which are made of electrically melted iron cast in permanent molds. This is done in a foundry which perhaps is unique in that it was originally designed for permanent mold casting. A large rotating Holley casting machine is used for most of the parts and is the chief production unit. Several stationary types of permanent mold machines take care of large castings and of special work and one small section of the foundry is equipped with sand molding machines but that is in the nature of an auxiliary.

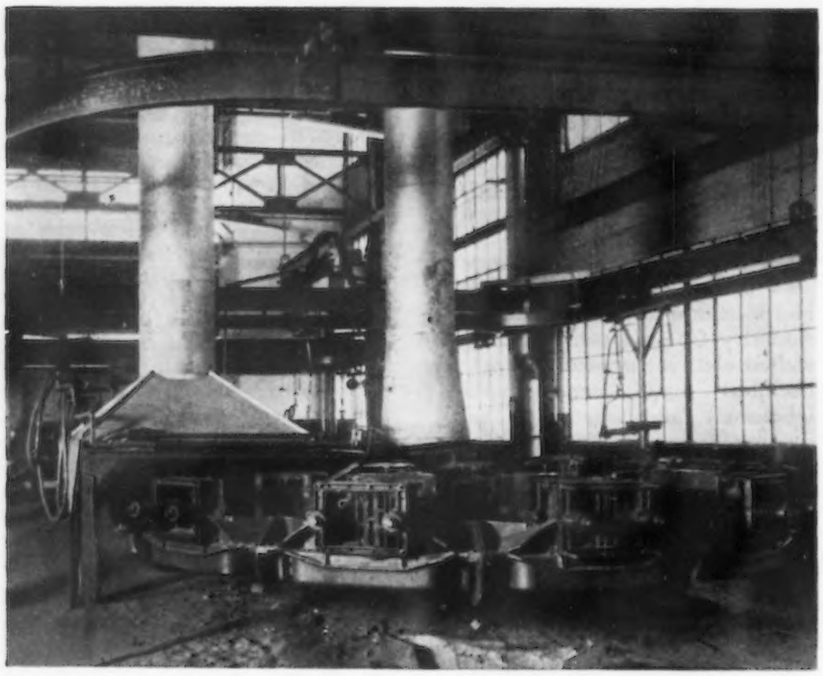

Fig. 1. Continuous and near-automatic production of cream separator castings is accomplished by this rotary casting machine.

A feature of the design of the plant is its flexibility which, combined with high unit capacity, permits low inventories. Under stress the production speed is so high that even with an active demand almost no complete cream separators need be kept in stock. At present, with somewhat reduced demand, the company is doing an unusual job. It is using its Detroit electric furnace to make its own pig iron out of the scrap which develops in other departments of the plant.

This is done for two reasons. More scrap is produced in the machine shops than can be used for production of the regular castings and in addition the contract for electric power calls for a minimum kilowatt consumption above that required for present foundry operation. Therefore advantage is taken of slack periods to produce pig iron for storage for future use. The pigs are of the exact analysis required so that they may be melted without additions when they are used. The analysis of the cost of the pig iron thus made (not including power charge) gives a value of about $17 per ton. This includes a $4 charge for electrodes and about $4.50 for ferro-alloys, principally ferro-silicon, ferro-manganese and ferro-phosphorus.

Under normal conditions the electric furnace is operated continuously throughout the day, receiving a charge of about 500 lb. every 10 min. When part of the work is produced in sand molds the general scheme is to pour permanent molds in the morning and sand molds in the afternoon thus giving the molders time to build up a supply of sand molds. Large bull ladles carried on an overhead trolley system are transported as desired to any part of the foundry. Actual pouring in most cases is from small ladles filled from the bull ladles.

Permanent Molds Used

An interesting example of mass production methods as applied to the foundry is provided by the rotary casting machine. In design this machine is like a large horizontal wheel carrying near its rim 12 permanent molds each arranged for automatic closing, ejecting and cleaning. The sequence is something as follows: At the first stage one man does all the pouring, being supplied with iron in small ladles by an assistant. The motion of the wheel is a series of 1/12 turns which bring each mold successively into each of the 12 stages. After pouring, the molds remain closed for a short interval to permit freezing of the metal. It has been found important

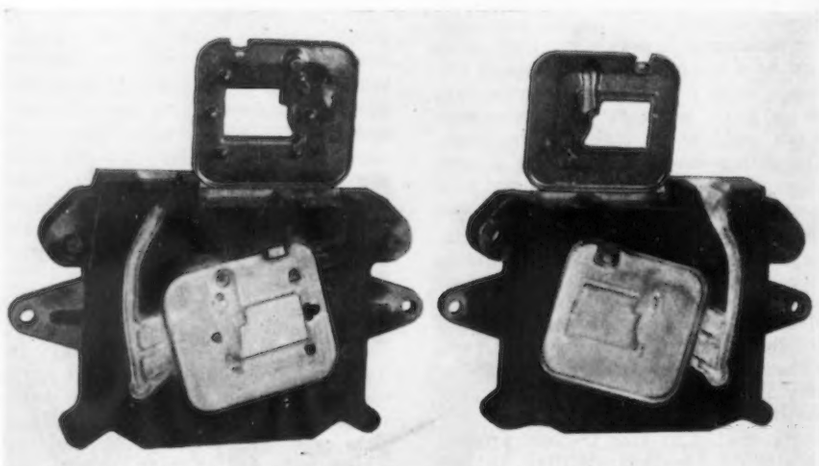

Fig. 3. Two parts of a cast iron permanent mold, together with the two sides of the casting which it produces.

Cream Separator Parts

By HERBERT R. SIMONDS

ONE of the first foundries to be designed and built as a permanent mold foundry is now in operation producing gray iron castings for cream separators for The DeLaval Separator Co., Poughkeepsie, N. Y. The accompanying article describes some of its features, with particular reference to the use of permanent molds.

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to open the molds at the earliest possible point and as this point varies with different types of castings the opening mechanism of each mold is separately controlled by cams. In most cases the molds are opened after traveling a quarter of the distance around the circle.

Immediately after opening, ejector pins force the castings out of the molds and on to a steel chute which carries them through an opening in the floor to the annealing and cleaning departments below. Soon after the castings have been ejected, the molds which remain in open position encounter a series of air blasts. These impinge upon all surfaces and are of sufficient strength to thoroughly clean the molds. After cleaning, the molds pass to a so-called smoke stage. Here a series of carbonizing acetylene jets coats all surfaces with a layer of lampblack. After leaving the smoke stage the molds remain open for a short space to permit the placing of cores, in case cores are required, and also to facilitate inspection. Just before they return to the pouring stage the molds are closed by air pressure and are kept closed against the pressure of the hot metal by a toggle joint device.

Baffles Eliminate Strains

Naturally with such a semi-automatic operation many difficulties were at first encountered and to overcome these was a problem more for a mechanic than a foundryman although both arts must go hand in hand in permanent mold work. One of the chief difficulties was the sticking of hot castings at the gates, preventing ejection. This was overcome by redesigning the gates. Another difficulty was found with the air cooling system. The molds at the time of pouring are cooled by a strong air blast which passes through a series of cooling pins on the back of the molds. Such a blast impinging equally on all parts tends to chill the thin sections of the

Fig. 2. A stationary type of permanent mold casting machine. Many of the features such as opening the mold and ejection of the casting are automatic.

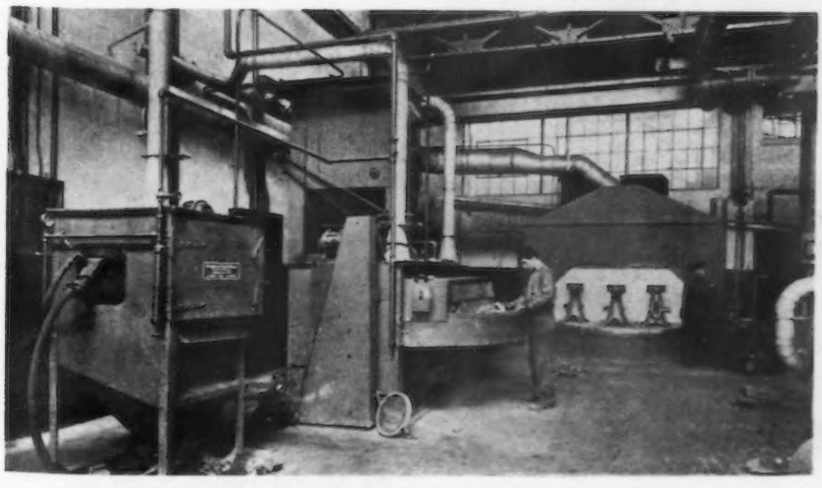


Fig. 4. A corner of the cleaning department in the permanent mold foundry.

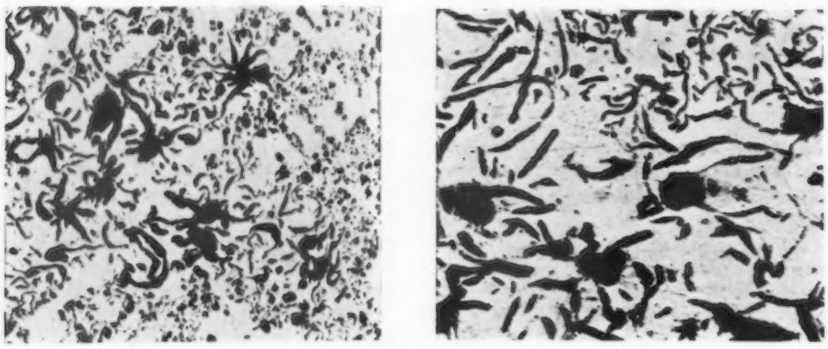
casting first, causing serious strains. This difficulty was overcome by introducing baffle plates especially designed for each casting, to modify the blast and thus equalize the cooling effect on the heavy and thin sections. In this way not only were strains eliminated in the castings but also in the molds and it was found that the use of proper baffle plates frequently would double the life of the permanent mold.

Molds Are Cast Iron

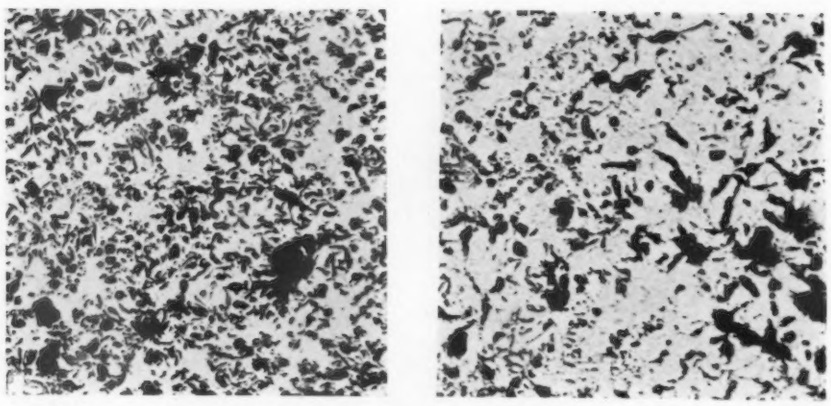
These molds are made of a special analysis cast iron and are machined on a Keller automatic profiling machine. Considerable care is exercised in the design of the mold itself. Patterns are first made in the usual way and, from these, castings in sand are made and examined before the

Comparison of graphite in permanent mold castings and sand cast iron. Magnification in all cases x 100.

PERMANENT MOLD CASTINGS | SAND CAST IRON



1 in. section as cast



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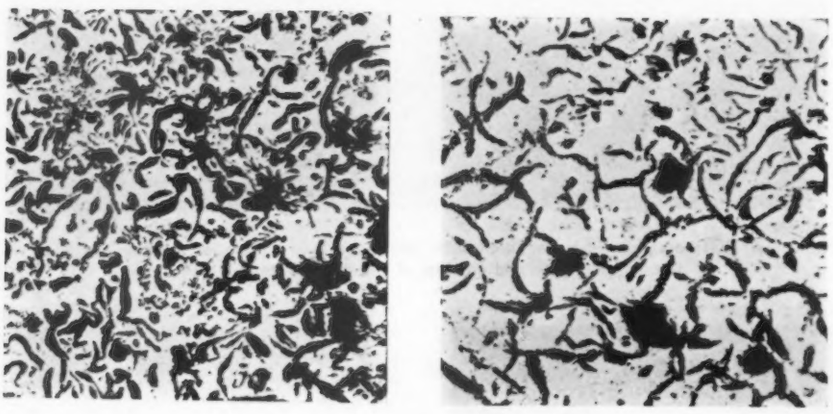
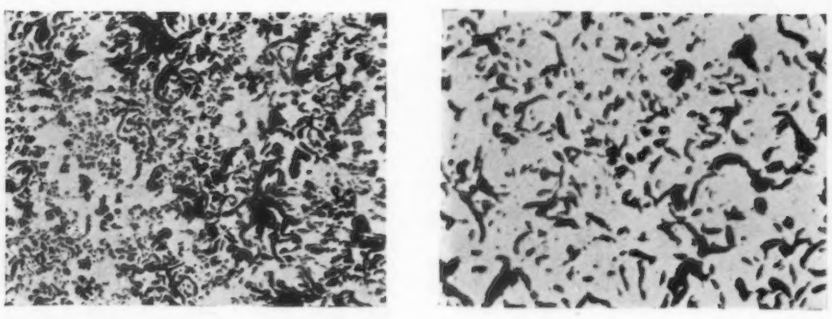


1 in. section annealed at 1400 deg. F.



⅜ in. section annealed at 1400 deg. F.

final permanent molds are made. Immediately back of the surface of each mold a forest of cooling fingers is provided. These are about 3 in. high, 5/8 in. in diameter, and are spaced with centers about 3/4 in. apart. In most castings ejection is possible with one ejection pin which extends through the mold at about the center. The life of a mold averages 10,000 impressions and on complicated work this means that the cost of the mold is an appreciable item as the molds cost from $250 to $400 each. Sometimes on intricate castings even the most careful designing does not produce a successful mold and after a trial on actual production certain changes have to be made such as increasing clearances, altering gates or changing the location of ejection pins.

No direct comparison of the cost of sand molding and permanent molding has been made because of the many difficulties involved. It is necessary of course to have conditions otherwise approximately equal for a strict comparison. Thus a continuous rotating sand molding and casting machine would be required for comparison with the present permanent mold machine.

The company uses permanent molds both for economy and quality. With conditions otherwise the same the grain structure is finer when metal is cast in iron molds. The same analysis of iron produces a different structure in an electric furnace from that produced in a cupola and also the same electrically melted iron varies in structure depending upon whether it is poured into a sand mold or into an iron mold. These differences are shown in the accompanying photomicrographs.

Annealing

After dropping from the casting machine the castings slide down an inclined steel chute to a point convenient for loading on to a continuous pusher type annealing furnace. Under normal conditions the castings enter this furnace still red hot thus utilizing the initial melting heat to help in the annealing operation. The annealing cycle is about as follows: Trays with castings enter the furnace at 10-min. intervals and remain in the preliminary heating section 1½ hr., then 2 hr. at high heat of 1500 deg. Fahr. and finally 1½ hr. at slow cooling. The trays are nichrome alloy castings 4 ft. long by 15 in. wide and hold from 40 to 50 castings. After annealing, the castings follow through the usual sequence of cleaning operations including the use of electric and oxy-acetylene welding for repair. Usually the gates are broken off while the castings are still hot.

A New Core Binder

The operation of the rotary casting machine developed a need for a core which could be easily removed from the finished casting, would not stick to driers and at the same time would

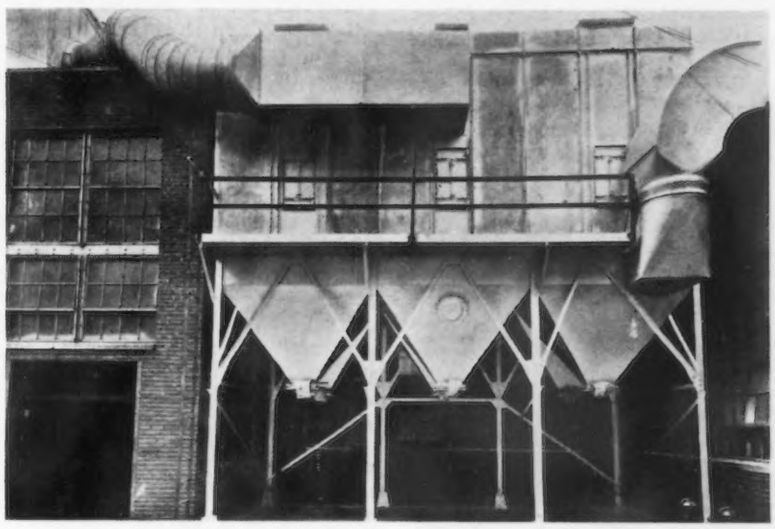
be sufficiently strong to stand up in use. After considerable investigation a new core binder was found which not only met these conditions but also lowered core costs. Strangely enough, this binder is an emulsion of core oil and water, produced in a centrifugal emulsifier which is one of the company's regular products. This binder, owing to the smaller amount of oil used, generates less gas both in the baking of the core and in its use later in the casting. It also makes it possible to bake the cores at a lower temperature and in a shorter time than when regular core binders are used.

Cores made from this emulsion are said to have a hard outer surface with an interior which is soft and easily knocked out of the finished casting.

Recovers Core Sand From Sand Blast

DUST from sand blasts is being exhausted in the cleaning room of the Cleveland foundry of the Aluminum Co. of America by a dust collection system of a new type designed by the Dust Recovering & Conveying Co., Cleveland. The system is used thus in cold weather restoring warm air and reducing the heating expense.

In the dust recovery systems of this general type previously installed several dust filters were placed in cylindrical metal compartments or housings, each compartment provided



for exhausting the dust from one double and two single sand blast units. While the method of collection of dust, which is with the use of fabric filter bags, is similar to that employed in dust collecting equipment previously built by this company and including a large dust recovery system used by the Ford Motor Co. in connection with its tumbling barrels, the system provided for the Aluminum plant is so designed and simplified that the cost of the equipment has been brought down to a figure where it is claimed to be an economical installation for use in a cleaning room of a moderate sized foundry. In addition it takes much less floor space than would be required with the use of cleaning equipment of the design heretofore made by this company.

The volume of air drawn through this system is 20,000 cu. ft. per min., which is sufficient not only to carry away the dust from the sand blast but the circulation provided assures the cleanliness of the air in the cleaning room. The system is so arranged that by adding additional piping, clean air that is now discharged into the atmosphere after the dust is removed may be returned to the cleaning room, with pneumatically operated mechanism for cleaning the bags by vibration. Several of these compartments made up a unit, the number depending on the cleaning capacity required. All the filter bags are inclosed in one sheet metal housing with overall dimensions of 25 ft. x 13 ft. in the installation at the Aluminum company's foundry. There are 360 filter bags 9 ft. long, 8½ in. in diameter at the bottom and 7 in. at the top. Each bag is hung around a cover at the top and clamped in place. The bottom is clamped around a collar in the bottom plate. Forty bags are hung on a frame and there are nine of these frames. Each frame is supported by an eccentric mounted on a shaft.

Air is drawn through the system through a 34-in. line by a Number 80 Clarage fan driven by a 50-hp. motor located on the roof of an adjoining building. This intake line connects at the bottom of the filter housing. Air is drawn over the top of three hoppers into which the coarse particles of dust are precipitated and the fine dust is carried up by the air current into the filter bags. As the air is drawn through these bags the dust is deposited on the interior of the bags. The clean air passes into a manifold at the side of the housing and from that through a 34-in. pipe connected to the exhaust fan.

The filter bags are cleaned all at once at the end of an 8-hr. period by vertical vibration which is effected by actuating the eccentrics from which the frames are suspended. This is done by a motor with a manually operated switch which drives the eccentric shaft. The fine dust which is shaken from the inside of the filter bags passes down to the hoppers beneath. It takes only 15 seconds to clean the filter bags. Three aisles are provided in the compartment so that the bags may be reached for repairs or replacement. Access to the aisles is from three doors at the side of the compartment.

Tests of the system as measured by the water gage show that the accumulation of dust on the filters causes a variation of only 1 in. or a 5 per cent reduction in the draft from the beginning to the end of the 8-hr. operation. In other words, 19,000 cu. ft. of air per min. are being drawn through the system at the end of the 8-hours' use. Much or all of the sand is reclaimed for use in the core room. The coarse sand, comprising about 25 per cent of the total, is usually removed before the fine dust is shaken from the filters. However, at times when a great deal of work is being done in the core room and the cleaning department is not very busy, both the coarse and fine material are reclaimed for core room use.

Cement-Coated Sheets

A CEMENT-COATED steel sheet for building purposes that has high weather-resistance has been evolved for the H. H. Robertson Co., Pittsburgh, by D. S. Hubbell of the "Protected Metals Fellowship," established with the Mellon Institute, Pittsburgh. According to the annual report of the director of the institute, Dr. E. R. Weidlein, the material, which is named "Hard Finished Robertson Protected Metal," consists of a core of asphalt and asbestos protected steel that is enveloped with a cement possessing novel properties. It is soon to be placed on the market in three colors—red, green and buff.

Cupola Charging Made Easy At Nash Motors Foundry

By ROGERS FISKE

FIVE men have replaced 25 workers at the job of charging cupolas at the Nash Motors Co's. foundry, Kenosha, Wis. From car unloading to the discharge of drop-bottom buckets in the cupolas there is practically no manual labor except in pulling materials from sloping bins into the charging buckets.

The general layout consists of two No. 11 cupolas and two No. 12 cupolas. These stand parallel to the north wall, about midway of the length of the foundry and about 35 ft. in from the wall. A 15 ft. by 20 ft. scuttle is open in the charging floor which extends from the cupolas to the north wall of the building. Operating above the charging floor is an electric crane which is especially equipped to handle the charging buckets.

Each bucket consists of a cylindrical steel shell fitted with trunnions. The bottom is a cone shaped casting from which extends upward a rod with an eye at the top. The crane controls are so designed that the bucket is raised and lowered by the trunnions and the bucket bottom may be dropped and raised independently of the bucket motion. The scuttle opening permits the buckets to be raised from the ground level on which are operated two electric scale trucks.

Scrap and pig iron are stored in sloping bins. Coke and limestone are in the hoppers above the truck.

All materials, with the exception of some pig iron are stored under a steel shed, which parallels the main foundry structure. Under the roof and along the north side of the shed is the railroad service track. Bins from which material is taken at rather infrequent intervals are of conventional design. However, opposite the cupolas are specially constructed bins which eliminate labor and facilitate the fast movement of materials such as scrap, pig iron, coke and limestone. Overhead, serving the full length of the materials shed, are two traveling cranes.

On the ground level and at right angles to the building are two parallel standard gage tracks that extend from the railroad service track to beneath the charging floor scuttle. On each track is an electric scale truck, one operator having charge of both trucks. On each side of these tracks and under the shed are bins that slope down toward the tracks. The sides and backs of these bins are made of reinforced plates. The bottoms are made of rails, one placed against the other, with heads up. Asphalt fills the spaces between the rails. The slope is about 45 deg. The bottom of the bins terminate at a 6 ft. platform which is at the level of the top of a charging bucket when it is standing on one of the electric trucks.

Sloping Bins Aid Delivery

There are three sloping bins on one side, each of a carload capacity. One of these bins contains soft iron scrap, another hard iron scrap and the third steel scrap. Above the truck tracks are six overhead hoppers, each of a carload capacity. Five of these are used for coke and one is used for limestone. On the opposite side from the scrap bins are five sloping bins. One is for foundry iron, one for malleable pig iron, one for K. C. iron, one for K iron and one for chrome briquettes.

Under normal operating conditions only four men are now used for handling materials and charging the cupolas. If the foundry is rushed it may be necessary to add a fifth man at the material bins. Previous to the use of this installation 25 men were required to bring the foundry up to capacity.

The operation is as follows: One man is in the cupola charging crane.

A second man operates the two scale trucks and the third and fourth men load material from the platforms at the lower end of the bins into buckets standing on the trucks. Materials are loaded direct from railroad cars to the bins. The truck operator moves a truck on which is an empty bucket opposite, say, the coke bin. He remains with that truck until the bucket is loaded when he runs the truck back under the scuttle. He may then step to the other truck which has been unloaded and is ready for movement to the bins for reloading.

Truck Operator Avoids Lost Time

The charging crane operator lowers the crane hooks which are attached by the truck operator. The loaded bucket is raised, run in over the cupola bed, discharged and lowered to the truck. The cycle is a round trip using first one truck and then the other, the trip starting with an empty bucket, having it filled and then returning it to a point below the scuttle. The truck operator avoids lost time and motion by stepping from one truck to the other when making the change.

An interesting experience is to be drawn from the use of these scale trucks. When first installed the beds floated directly on the scale mechanism. It was found that this was not satisfactory for the reason that the pounding of materials thrown into the buckets destroyed the desired accuracy of the scales. The design was then changed to provide a false top, separated from the truck top or scale platform by nests of open coil springs. The bucket now actually floats on a bed of springs and no further damage has resulted to the scale mechanism.

The charging crane lifts the loaded bucket from the electric truck and discharges the load into a cupola. Note the scuttle in the foreground.

The trucks in this installation were made by the Whiting Corpn., Harvey, Ill., and Fairbanks, Morse & Co., Chicago, furnished the scales. The charging crane and buckets were made by the Harnischfeger Corpn., Milwaukee. The operators report that these buckets, with cone-shaped drop bottoms, charge the cupolas equal in all respects to good hand practice.

Use of Gas Diffusion Burner System in Forging Work

By H. M. HEYN
Assistant Sales Manager,
Surface Combustion Corpn.

A CENTURY ago the only known method of forming steel was by hand hammers wielded by workmen. In 1842 came the first single-action steam hammer, and then, in 1888, the first double-action hammer was built at Midvale, Pa. During 1887 the first press was introduced into this country, and since that time the press has shown a very rapid improvement in the making of both large and small steel forgings. There is no question that the press has some very decided advantages over the hammer, such as producing better forgings, absence of shock, greater metal reduction, fewer skilled operators, greater output, and a lower fuel consumption per ton output due to forming at lower temperature. However, the hammer has the advantage of being able to remove scale better owing to its heavy impact.

Along with the development of hammers, presses, headers, etc., during the last one hundred years, came the use of more modern fuels. Step by step the methods of heating steel for forging went from wood to coal, to oil and then to gas.

As presses and heading machines cannot knock off scale as the ham-

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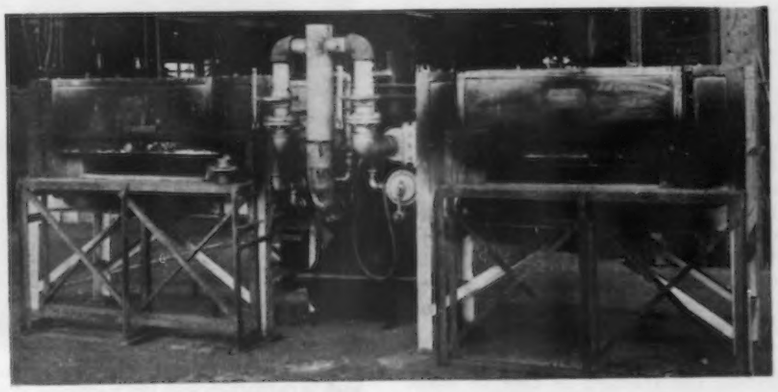


Diffusion forge furnaces at plant of Budd Wheel Co.

▲ ▲ ▲ Chrysler Casts Two Cylinder B

THE depression has taxed the wits of industry to originate new ways and means of manufacturing quality articles at the lowest possible cost. Nowhere have production methods been submitted so unmercifully to rigid inspection as in the automobile industry. If they didn't stand up, they were discarded in favor of something new. Precedent meant nothing; it was only results that counted.

One of the characteristics of the Chrysler Corpn., Detroit, has been its willingness to break with precedent, to carry production forward to new goals with heretofore untried processes. It has been in the foreground in its industry in rehabilitation and modernization of its plant and equipment to meet today's demand for cars of high quality at a relatively low price. Among the foremost of its recent achievements has been the perfection of a process in its foundry whereby two cylinder blocks are cast in a single mold.

This is the outstanding result of a program of foundry rehabilitation which has increased the output of castings 60 per cent without adding to the former floor space. Through installation of a new sand handling system and of conveyors for hauling materials, substantial economies have been effected. Core making has been put on a scientific basis by means of special core-blowing equipment and ingenious fixtures. In the core-making process tolerances have been reduced to limits heretofore never identified with gray iron foundry practice.

Metal Poured at High Temperature

The essence of the success in pouring two cylinder block castings in one mold lies in raising the iron to an unusually high temperature and pouring it rapidly. The iron is melted in standard-type cupolas to a pouring temperature of 2800 deg. F., whereas the normal pouring temperature of gray iron is considerably less. The amount of air and of coke used in the cupola is larger than ordinarily is employed in gray iron foundry work. Flow meters have been installed to measure the exact amount of air going into the cupolas. Every ladle of iron is physically tested before castings are poured.

By means of this new casting method, the foundry is able to make 170 six-cylinder and eight-cylinder blocks an hour for Plymouth, Dodge, De Soto and Chrysler cars.

Cores Set in Jigs

The coring operation is a departure from long-accepted practice. Cores are first set into an aluminum, steel-faced gage or fixture, made with the same accuracy as the jigs used in connection with the machining of cylinder blocks. After they are clamped in place, the gage is picked up with a chain hoist and two complete sets of cores are set in a single mold in one operation. The clamps then are released and the gage removed ready for the formation of the next set of cores.

Cores are blown on core-blowing machines, the operation of which is controlled by an automatic valve. That is, the operator starts the automatic cycle of core blowing by a single turn of the valve. Automatic timing of the blowing operation insures uniformity of the cores. At the air intake to the operating valve is a removable air screen preventing foreign particles from entering the valve and causing injury to valve seats. A safety valve prevents the blowing operation if the machine is started without the core box being in the proper position. A safety lever makes it impossible for the operator to injure his hands, since both his hands must be occupied before the clamping operation can take place. Powerful clamps hold the core box securely against the sand pressure.

At the top of the machine is a large sand bin which can be removed and

Two complete sets of cylinder block cores which each weighing 13 lb. 3 oz.

Cores are set into an aluminum, steel-faced fixture made with the same accuracy as the jigs used in connection with the machining of cylinder blocks. After they are set in place, the fixture is picked up with a chain hoist and two complete sets of cores are set in a mold in one operation.

Blocks in Single Mold

THE foundry of the Chrysler Corpn., Detroit, is producing 70 six-cylinder and eight-cylinder blocks an hour by a new process whereby two cylinder blocks are cast in a single mold. As the result of a rehabilitation program the foundry has increased its output 60 per cent without adding to its floor space. Substantial economies have been made by installing a new sand-handling system and equipment for conveying materials. Core making has been put on a scientific basis by the use of special core-blowing machines and ingenious fixtures.

▼ ▼ ▼

cleaned. Below it is a sand chamber designed to facilitate the flow of sand. A rigid guide arm insures accurate alinement of the table, this in turn guaranteeing correct alinement of the core box with the blow plate. The air pressure used in blowing cores is 90 lb. per sq. in. The vertical position of the table can be adjusted by means of a large handwheel just above the base of the machine.

Core Blowing Increases Output

The core-blowing machines occupy a minimum of floor space and produce more accurate cores than previously were turned out. The reduction in the amount of material scrapped has been large. Two men, using core-blowing machines, can now make 90 port cores per hr., each core weighing 6 lb. They likewise can produce approximately the same number of crankcase cores (weight—13 lb. 3 oz.) and of valve housing cores (weight—16 lb. 5 oz.).

There are 15 individual cores for each cylinder block casting: six crankcase cores, one valve chamber core, one valve port core, one main jacket core, one barrel jacket core, one rear housing core, one breather core, two water jacket stop-off cores and one oil filter core.

In the design of the sand handling system it was necessary to adapt the unit to conform to the existing foundry layout and to some extent to existing equipment. The results obtained are a striking example of what can be economically and effectively done in revamping an old foundry.

go into a single mold. The six crankcase cores, are seen at the rear.

Patterns are mounted on four stripping plate machines, two copes and two drags, which in turn are set on a revolving grate turntable.

Molds are rammed on a stationary-type sandslinger. Patterns are mounted on four stripping plate machines, two copes and two drags, which in turn are set on a revolving grate turntable. The drag mold is rammed, stripped and sprayed, after which it is transferred by means of a jib crane to a drag-chain conveyor. It is automatically dried by passing through a drying oven about 10 ft. long, the drying time totaling 3 to 4 min. Thus the mold does not come in contact with a direct flame and therefore dries in a uniform manner.

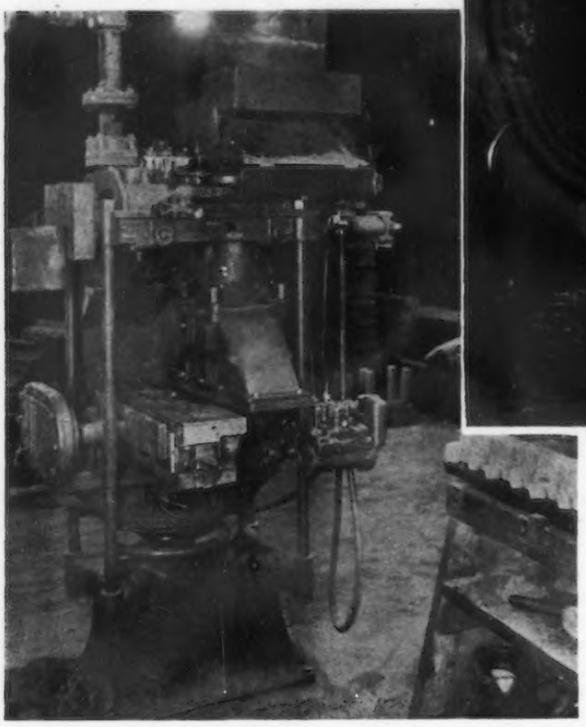
When the drag mold emerges from the dryer, the cores are set with jigs and the mold closed with the cope. Flasks are clamped and a runner box rammed and set on the mold with skimmer cores as the mold enters the pouring zone, which is about 40 ft. long with space for eight molds. Hot metal is handled from the cupolas in large ladles by overhead crane from which it is transferred to a hand pouring rail. Two castings, or cylinder blocks, are poured at one time from the same gate in 20 sec.

After the metal has been poured, the molds move slowly for 15 min. along the conveyor to cool before they reach the vibrating shake-out. Here the two cylinder blocks, fastened together by gates, are removed from the mold and are broken apart by air pressure and hung separately on an overhead monorail conveyor to cool for 3½ hr. Empty flasks are returned to the sandslinger on the return run of the mold conveyor, which travels in a horizontal plane around the entire unit.

At the end of the cooling period cylinder blocks are delivered by the overhead conveyor to the sand blast and cleaning room. They are then given a 100 per cent Brinell test prior to being sent to the various Chrysler car-making divisions to be machined.

Sand which is shaken out of the molds by the vibrating shake-out falls

through the floor hopper on to an overlapping apron feeder 66 in. wide, which delivers it to a 24-in. transfer belt conveyor located in a long tunnel in the basement of the foundry. Besides handling the shakeout sand, this belt returns the spilled sand collected by the revolving grate from the sandslinger to the shake-out sand storage bin. Provision has been made for



Production of cores has been greatly increased and the amount of material scrapped has been considerably reduced by the use of core-blowing machines which occupy a minimum of floor space.

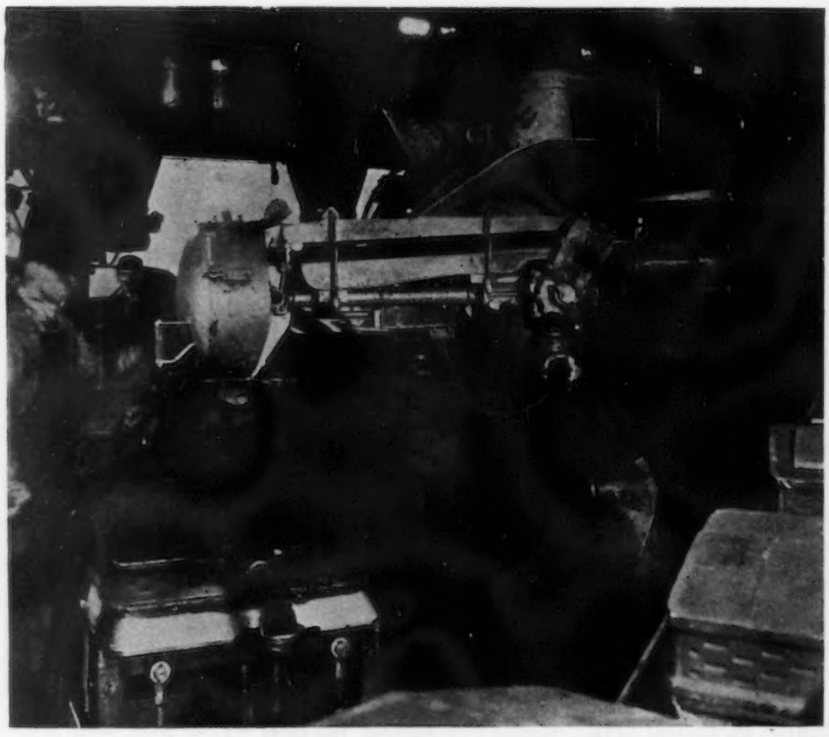
Iron is melted in standard-type cupolas to a pouring temperature of 2800 deg. F. Every ladle of iron is physically tested before castings are poured. Hot metal is handled from the cupola in large ladles by overhead crane.

again aerating and mixing the spilled sand with newly prepared sand and returning it directly to the prepared sand storage bin.

The tunnel belt conveyor is equipped with a magnetic head pulley 24 in. in diameter which removes metallic refuse as the shake-out sand passes over it onto a transfer belt. This belt carries it to a hexagonal revolving screen 10 ft. long and 4 ft. in diameter. Because of its tumbling action, the screen disintegrates lumps of molding sand and at the same time removes over-sized pieces of core refuse. Falling through the screen on to a belt conveyor, the sand is transported to a 24-in. single paddle mixer, where a small percentage of water is added for pre-tempering and to induce cooling of the hot sand by the mixing action of the pug mill.

Storage and Discharge of Sand

From the mixer the sand moves on a short incline magnetic belt to a vertical centrifugal discharge elevator which carries it to an overhead storage bin of 50-ton capacity. The bin is directly over a Simpson mill equipped with 9-in. wide mullers and with air-operated, double-discharge drop doors through which the batch of sand can be quickly discharged after it is mulled and mixed. Sand is delivered through two duplex gates from the storage bin into two batch measuring hoppers. These hoppers insure even batches of sand and provide a



Molds are rammed on a stationary-type sandslinger.

means for rapid reloading of the mill.

Hoppers below the mill have sufficient capacity to hold the mill batch of about 2000 lb. of prepared sand. A 24-in. flat feeder belt delivers the sand at a uniform rate from the hoppers to a vertical centrifugal discharge elevator. By this method a practically uninterrupted flow of prepared sand is obtained from the batch mixer. Sand is discharged by the elevator into a revivifier for aerating and "fluffing" the mulled sand before it is delivered to a 35-ton prepared sand storage bin located near the sandslinger. An overlapping steel apron conveyor carries the sand to an inclined transfer belt and thence to the sandslinger where it is discharged as needed.

To insure continuous operation under severe manufacturing conditions, all of the sand-handling equipment is of the highest quality. For instance, inclosed herringbone gear speed reducers are used on all new drives and Timken bearing anti-friction belt idlers on all belt conveyors.

Among the manufacturers cooperating with Chrysler engineers in equipping the foundry were the Beardsley & Piper Co., Chicago; the Link-Belt Co., Chicago; William Demler & Brothers, Kewanee, Ill.; W. H. Nichols Co., Richmond Hill, N. Y.; Osborn Mfg. Co., Cleveland; and the C. O. Bartlett & Snow Co., Cleveland.

Flash Equipment Cost Cut 90 Per Cent

NINE-TENTHS of the initial cost of flask equipment has been saved by Nash Motors Co., Kenosha, Wis., by the use of slip flasks and slip jackets when casting intake and exhaust manifolds, which weigh about 20 lb. each. This method is used in conjunction with a Beardsley & Piper Co., Chicago, sand slinger and a loop platform conveyor system. A grid platform has been placed over the revolving table so that only two strippers are needed, thereby reducing the number of patterns used.

Production on this equipment is at the rate of 600 pipes in 9 hr. The flask equipment now required consists of two slip drags, one slip cope and 12 slip jackets plus the necessary weights. These replace 110 flasks. No extra labor is required, the cost of wear and tear on flask equipment is greatly reduced and the cost of shaking out is cut 50 per cent.

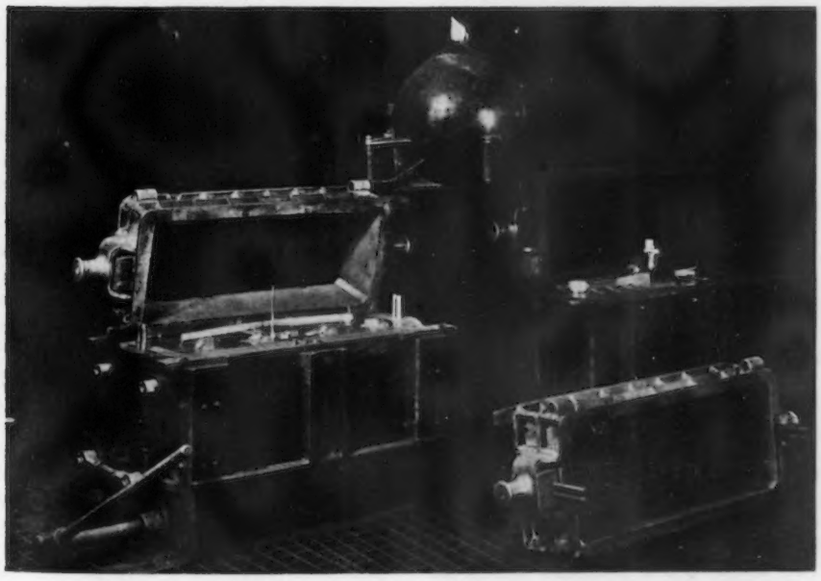
The sand slinger stands inside and near one end of the loop conveyor. Surrounded by a stationary grating through which spillage falls to a hopper are two stripping machines. A metal pattern is mounted on each machine, one of which is used for molding copes and one for drags. Two slip drags and one slip cope are provided. These are made of aluminum castings, bolted and welded at the corners to assure rigidity as well as permanence of alinement and each part is fitted with trunnions for handling by means of a jib crane. The flanges of the copes and drags are made extra heavy.

Operations consist first of ramming a drag which is moved by the crane to a cast iron bottom plate, two of which are on each conveyor platform. The slope of the sides of the slip drag is such that with the aid of sand strips it can easily be lifted off the mold. While the core setter is placing a core in this drag mold a cope is being rammed and the second slip drag has been placed on the stripper and is ready for the sand slinger. As soon as the cope is finished it is moved by the crane to the conveyor, placed on the drag to which a core has been fitted. The slip cope and drag are then removed from the finished mold.

The conveyor moves away from the loading point to a station where jackets are slipped over the molds. The jackets are made of iron, each side being cast separately. These sides

Slip jackets are made of cast iron sections which are bolted and welded over a template.

are made with flanges and when bolted and welded at the corners over a template form a rigid jacket, the sides of which taper to conform to the slope of the sides of the molds. The next operation consists of placing weights on the mold before the pouring operation, after which the slip jackets are lifted off and returned to the station where they will again be dropped down over completed molds. These slip jackets measure 13 in. by 32 in. at the top and they are 13 in. deep.



Only two strippers, two patterns, two slip drags and a slip cope are required to make 600 pipes in 9 hr.

Cast Iron from the Electric Furnace

By CLYDE L. FREAR
Metallurgist, Syracuse, N. Y.

THE writer has read with considerable interest the article by W. B. Crawford and R. B. Crawford entitled "Electric Furnace Cast Iron in the Jobbing Foundry," which appeared on page 700 of THE IRON AGE for May 4.

The authors of this article should be congratulated for the manner in which they have described the usefulness of this type of equipment, especially in times like the present, when it is necessary to run the foundry with very low production schedules and still hope to make, or at least approach, a profit on the work turned out. There have been a number of installations within the last two years for just such a purpose in cupola equipped foundries where it was found to be impossible to run the cupola economically with the present volume of business.

As the authors have further indicated, the electric furnace is also useful, and probably necessary, where a variety of grades of iron must be produced during the same melting period, as this method of melting is the only one which is sufficiently flexible to permit changing the composition of the bath in the furnace without an unreasonable amount of waste. Other points which the authors have mentioned are: the improvement in the properties of the iron resulting from refinement of the bath; the ease with which alloy additions may be made; and the short time required to produce castings by this process.

Direct-Arc Furnace Efficacious

The writer believes, however, that this article is rather misleading, as it seems to indicate that the excellent properties of the iron produced are due to a combination of high temperature and thorough mixing which can result only from rotating the furnace. For a number of years the writer has been producing gray cast iron in a direct-arc electric furnace, which, of course, does not require rotation or rocking of the furnace itself to stir the charge or ease the sidewall refractory temperatures. In all this time, he has not encountered any difficulty in effecting a thorough mixing of the charge in a furnace of this type, nor has he ever encountered any heterogeneity in melts made in a direct-arc furnace that could be traced to the furnace itself.

As is well known, the heat in a direct-arc furnace is applied directly on the surface of the bath by the arcs playing between the lower ends of the electrodes and the bath itself to effect the further flow of the current through the molten metal. The passage of the current through the conducting bath sets up magnetic fields which, in turn, cause a gentle but thorough mixing or kneading of the metal composing the furnace charge.

If the bath of metal in a furnace of this type be examined when the current is flowing but with the slag purposely removed, it will be noted that there is a constant movement of the surface metal away from the electrodes, which movement is sufficient to mix the bath thoroughly but not sufficient to cause erosion of the hearth and walls which are in contact with the metal.

An analysis of the table accompanying this article shows excellent results in the increase of physical properties due to time, temperature, and diffusion effected by the contact of the refractory lining with adjacent portions of the bath. Considering the samples cast at 2600 and 2800 deg F. without rocking, there could be little improvement expected as a result of simple heating, as, without mixing of some kind, the refining due to the higher temperature would occur only on the surface of the bath where the heat from the arc was concentrated.

In this connection, it would be interesting to know how the temperature readings were obtained, whether they were taken on the surface of the bath in the furnace or from the stream of metal during tapping. Due to the absence of any stirring and the consequent heterogeneity of the bath, it appears to the writer that these first two temperature readings would be rather difficult to associate with the properties as given in the first two columns. The improvement in properties as indicated in the last two columns can be explained by the increase in temperature from 2800 to 3000 deg. F. when we consider that these two samples were poured from somewhat better mixed iron and that, at the higher temperature, graphite solution proceeds very rapidly.

The writer has conducted experiments on the effect of holding a heat of iron at a low temperature in a direct-arc furnace on the physical properties of the resultant castings. The composition chosen was one for thin castings requiring very good machining qualities and close texture, but not high strength. The accompanying table gives the more important physical properties obtained in one of these tests:

Cast Iron from Electric Furnace at Different Temperatures

Test	A	B	C	D
Refining time, hr..	None	½	1	1¾
Temperature at spout, deg. F....	2,500	2,530	2,570	2,700
Tensile strength (lb. per sq. in.).	18,200	20,200	20,500	22,000
Per cent increase over previous sample	...	11.0	1.5	7.3
Brinell hardness...	131	134	143	149
Machinability	258	232	235	242

It is the experience of the writer that, while high temperature is very effective in causing graphite solution, the iron can readily be permitted to become over-refined so that the machinability of the resulting castings is materially reduced in addition to the shrinkage tendencies being greatly increased. Low temperature refining, on the other hand, will produce iron with as high strength with the same composition, but as a result of the closer control of graphite, the machinability will remain almost constant and shrinkage can be entirely eliminated.

Due to the heat being produced directly on the surface of the bath in a direct-arc furnace, the metal directly under the electrodes becomes highly refined but is immediately replaced by slightly cooler metal which, in turn, becomes refined and mixes with the main portion of the bath. This constant heating and mixing refines the whole bath in a short time and at a temperature much lower than that required to effect the same refinement when the whole bath is heated by reflected heat. At the same time, sufficient graphite nucleii remain in the bath to produce excellent machining qualities and eliminate shrinkage, but these graphite nucleii are not large enough or in sufficient quantities to reduce the physical properties of the resultant castings.

This comment is not intended as a criticism of the original article but is an expression of the writer's belief that the article as printed does not point out all the possibilities of the electric process or all the methods by which improvements may be effected in the properties of gray cast iron as a result of electric furnace melting.

The Time Is Ripe to Introduce Uniform Foundry Trade Practice

By A. FOUNDRYMAN

DURING the present period of economic planning, the establishment of uniform trade practices is of utmost importance to the foundryman. Only through rigid and adhered to rules, can we obtain a fair competition, void of cutthroat methods. We still have a majority of foundrymen who have not taken and are unlikely to take an active part in the price war that has been raging among certain sections of the foundry industry during the past year or so. However, there are many who are always out to secure an order from any source regardless of the cost of the special service rendered or whether or not a profit is made. But the ones who expect to remain in business and endeavor to render a good service at a fair margin of profit as well as keeping the good will of their customers must look to the future and take stock of the various practices which have crept in during abnormal times. Once these are established, the customer will invariably insist that they be continued no matter how costly they may prove to the foundry.

Like many associations, the Ohio State Association of Foundrymen, some years ago adopted their "Uniform Trade Customs" which were agreed to by the Association of Purchasing Agents and many others. Among these were rules pertaining to the storage of patterns, pattern insurance, proper marking and repairing patterns, charges for storage on obsolete parts, matters regarding invoices, payments and discounts, extra charges on all special and rush work, haulage, etc. It can be safely said that a very great many of the foundries completely ignore such rules.

An Unfair Advantage

By disregarding some or all of these customs, one foundry may have a decided advantage over another, although their prices quoted to the customer might be the same. It is for such cases, presumably, that the administration (Wagner) bill empowers a federal board to bring about improved trade practices and it is very likely that government authority will be called in to back up decisions of the trade groups. Another bill that is about to be presented to Congress, if passed, will allow industries to line up syndicates for the adoption of trade agreements. In his address before the Chamber of Commerce of the United States a short time ago, President Roosevelt demanded that cutthroat competition must come to an end and if it does not, government authority will be used to end it. It is generally believed that minorities who follow unfair practices will be coerced if they persist in following independent policies. And again in his address, the President said, "I can assure you that you will have the cooperation of your government in bringing these minorities to understand that their unfair practices are contrary to sound public policy."

OWING to the trend of economic planning and the President's purpose of compelling fair competition, the time is ripe, says the author, for the establishment of uniform foundry trade practice. Let us get rid of the sugar coated rebates and cutthroat competition, and put the merchandising of castings on a business-like and profitable level.

▼ ▼ ▼

It can be assumed that a new deal is opening to the legitimate foundryman, the long awaited opportunity to put into force such practices as will enable him to compete with the less scrupulous.

By disregarding various long established rules, numerous foundries are allowing their customers to impose upon them to the extent of insisting that they make many of the various pattern changes which should by right be made at the expense of the customer. In other cases the customer demands that patterns be hauled free of charge on foundry casting trucks and where loss or damage results he often charges back to the foundry whatever this loss may be. And the foundryman, being afraid that he may offend his customer, complies with the customer's demands in such matters.

Status Must Be Respected

It is not unfair to state that the casting buyer too often considers the foundry as a sort of back yard source of supply. The average foundry may not be as clean and dignified as is the machine plant, nevertheless it must be appreciated that it is a legitimate branch of the metal working industry, and that a profit must be made on the work processed. It is the clear cut duty of the foundryman to insist that this status be respected.

The casting buyer thinks nothing of calling in an order late in the day, asking that cores be dried and the casting made in that day's heat. Very often he has nine of these pieces in stock and rushes the foundry for the tenth piece in order that the machine shop may be able to put through the usual run of ten pieces. This is a matter of almost daily occurrence in most any jobbing shop and in rendering such service, which is seldom considered when quoting prices, the foreman usually has to break in on some molder's scheduled day's work and no extra charge is made for the casting. Such breaking in on jobs would not be tolerated in the customer's machine shop, still he does not hesitate to insist that it be done in the foundry. A fair and honest charge for such work could be brought about by the adoption of established trade agreements.

Another very costly item to the foundry is that of making castings from damaged and worn out patterns. The owner should furnish patterns in good workable condition, properly marked (fool proof as one might say) in so far as assembling the parts is concerned. All foundrymen should stand solidly together in refusing to use patterns that are not in proper condition. Especially is this so in regard to repair parts. Most repairs

are made from old and sometimes delapidated patterns and often from old castings that are in no fit condition to be placed in the sand. Yet the foundry is asked to run them and great objection is made if the buyer is asked to pay an extra price for such work although he himself receives a much greater percentage of profit for repairs than on any regular machine that he sells.

Another item that castings buyers should be charged with is that of time lost in shaving or patching molds, often due to the owners neglect to alter a pattern, either through oversight or to save the expense of a pattern change. Such work along with the filing of cores, etc., is usually given as free time by the foundry and it is no more than just that it should be charged to the customer.

Free Pattern Storage

Another of the trade customs of the Ohio Association is that pertaining to pattern storage. What appreciation is given by the customers for the foundries that are providing expensive storage space for their patterns that have remained practically dead during the entire length of the depression? Or who can estimate the tremendous amount of money invested in pattern storage buildings throughout the country, some of which fairly bulge with obsolete patterns, core boxes and follow boards? Trade customs should provide for a nominal charge for such storage. It would seem only fair that when business finally revives, a customer should leave his work with the foundry that has provided this free storage and that any orders coming up should be placed with him instead of hauling out the patterns to some competitor who might shave his price a fraction.

Establishment of Invoice Practice

A rigid custom or practice in relation to invoice payment and discounts should be established throughout the industry. There has been no end to the unfair competition, often unintended, due to various privileges allowed in discounting by the customer. As one example; two foundries in a Mid-western city had been competing for some time on the work of an out of town customer. Periodically, this buyer would be in the market for a quantity of castings. The work was usually divided between these two shops. Dependent on price, sometimes one would get only a small part of the order and there was a great deal of running back and forth by the representatives of the two foundries. The two foundrymen finally got together, compared notes and agreed to submit the same prices on the various parts, leaving it to the purchasing agent to divide the work as he usually did when the prices had been the same. Shortly afterwards one foundryman learned that his competitor had

(Concluded on Advertising Page 14)

High Chromium Cast Iron for Smoke Resistance

By RICHARD TULL
Electro Metallurgical Co.

THE choice of a suitable alloy to withstand the corrosive action of locomotive smoke and steam was recently encountered. It was suggested that 13 per cent chromium cast iron should be used. It is felt that a discussion of the factors influencing the recommendation of high chromium cast iron for this service will be of interest to many design engineers and will aid in the solution of similar design problems calling for a relatively inexpensive metal which is resistant to smoke and steam corrosion.

In selecting a material it was necessary that it be resistant to the corrosive effect of exhaust gases and steam from locomotives burning coal with a relatively high sulphur content, and also that it be resistant to the abrasive effect of the hard particles carried in the locomotive exhaust. It was of utmost importance that the material have relatively long life since frequent repairs and replacements would add to the cost of operation.

In order to compare the corrosion resistance of ordinary gray cast iron with iron containing various amounts of chromium, specimens were placed in a synthetic atmosphere of carbon dioxide, sulphur dioxide, air, and steam at a temperature of about 500 deg. C. At the end of the test the samples were removed and cleaned with fine emery paper and the resulting losses in weight in grams per sq. cm. for the indicated time were as follows:

Chromium, Per Cent	Loss After 288 Hr., G. per Sq. Cm.	Loss After 528 Hr., G. per Sq. Cm.
0	0.0142	0.0242
11	0.0084	0.0080
14	0.0079	0.0071

It is of particular interest to note that the losses on the samples containing high chromium were practically the same for the 528 hr. test as they were for the 288 hr. period, while those for the straight cast iron were much higher. These results would be even more striking for tests of longer duration since the losses incurred by the chromium iron are not cumulative. A small amount of scale, once formed on the outer surface of the high chromium castings, acts as a protective coating which arrests further corrosive action. The plain cast iron would continue to be destroyed, whereas the chromium-bearing cast iron exhibited the maximum amount of corrosion possible after a relatively short period of time.

Why Ordinary Iron Deteriorates

The rapid and continuous deterioration of the ordinary cast iron is explained by the fact that it is comparatively soft, and its structure is broken up in every direction by small flakes of graphitic carbon. This graphite is soft and has no strength and the small channels in which it is located give access to corrosive influences. Recent experimental data show that under moist acid conditions, the flakes of graphite and the body of iron make up countless electrolytic cells, thus accelerating the corrosion. The carbon in the 13 per cent chromium cast iron, however, is in the combined form and there are no graphite openings to offer access to the corrosive action of the gases. In addition to these indirect advantages, there is, of course, the well known corrosion resistance of the high chromium alloys.

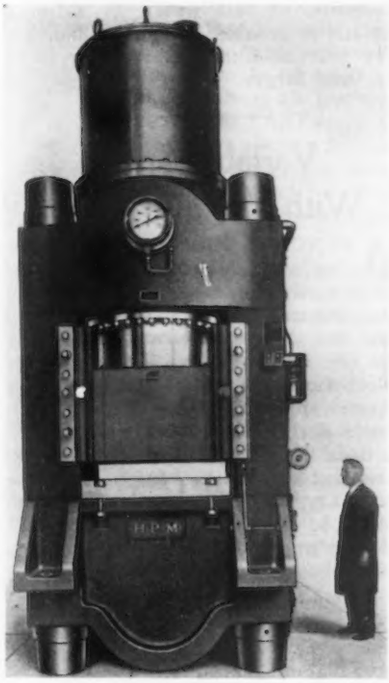
When cast iron containing 18 per cent chromium is used for guide shoes and furnace parts subjected to smoke gases at much higher temperatures than those described above, it has a life of 5 to 10 times that of ordinary gray cast iron.

High chromium cast iron can be made in the cupola by means of the addition of chromium briquets to the charge. Additions of chromium in the form of briquets result in almost 100 per cent recovery of this metal, and no difficulty is experienced in the pouring of ordinary shaped castings.

Though the initial cost of 13 per cent chromium cast iron is in excess of that of ordinary gray iron, its life in service would be at least 500 per cent that of the ordinary iron. The cost of the frequent replacement of plain cast iron would be far in excess of the greater initial cost of 13 per cent chromium castings. Where resistance to the corrosive action of smoke gases and resistance to various forms of abrasion, coupled with permanency of installation, are desired, the designer who specifies high chromium cast iron will find that this material will most economically meet requirements.

Self-Contained Heavy-Duty Stamping Press

HEAVY-DUTY production presses of the design illustrated are being offered by the Hydraulic Press Mfg. Co., Mt. Gilead, Ohio, for heavy sheet metal stamping, forming, embossing and similar die work. The machines are motor driven and are entirely self-contained. Rapid operation is combined with powerful pressure capacity, and the frame is of



the rigid construction necessary for operating close-fitting precision dies.

The oil pressure system employed provides rapid advance of the ram to the work, quick reversal upon attainment of the desired pressure and rapid return. The pressure generating pump, driven by a direct-connected electric motor, is mounted across the rear of the press head. The entire supply of oil, both for the pressure system and for lubricating, is contained in the overhead tank.

Operating flexibility is attained through the various controls. This includes automatic adjustable pressure regulation, variable stroke and die shut height. The operating cycle may be carried out in complete automatic sequence making single strokes or running continuously as desired, according to the setting of the electric control. Two-hand electric push button starting is standard. An emergency reverse button is also included. The automatic cycle control may be cut out when desired, and all movements controlled manually through a hand lever that governs both the speed and direction of ram travel.

The frame uprights are of massive box-type construction with forged steel tie rods shrunk in place. It is stated that these rods are prestressed so that even a 50 per cent overload would not produce any stretch. The slide is guided at each corner by long gibs adjustable front and back. These are provided to assure accurate alinement of punch and die, but are not required to take any side thrust. The bed is a steel casting of deep heavy section.

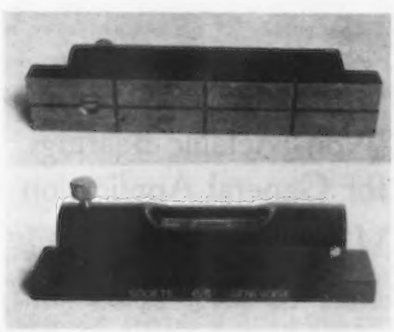
The normal pressure capacity of the press shown is 1500 tons. The bolster plate measures 48 x 48 in., and the slide, 40 x 40 in. The maximum opening is 18 in., the maximum travel 12 in., and the minimum shut height is 6 in. The same type of press is built in a series of standard sizes and pressures ranging from 100 to 2000 tons.

Precision Level For Shop Use

THROUGH its American agents, the R. Y. Ferner Co., Investment Building, Washington, the Société Genevoise d'Instruments de Physique is placing on the market a high precision level, reading 5 sec. of arc per division, which is particularly adapted for shop use, for checking machine tools and high-speed transmissions, setting sine bars on inclined surfaces, leveling base plates and machine beds, and for manufacturing all kinds of tools and fixtures.

The body is of hard steel, machined from the solid, so that it is insensible to shocks and protects the level vial against temperature variations and hand heat. The base is carefully scraped and is provided with cleaning grooves. It is 6½ in. long and 1 3/16 in. wide, and weighs 2.1 lb.

The level vial is cemented in a brass mounting which is adjustable by means of a knurled screw. This per-

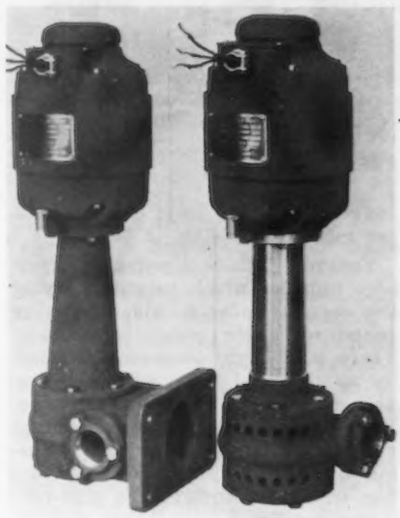


mits setting the vial to zero and also to use the level for slightly tilted surfaces, which is often desirable in checking the ways of machine tools. It also permits measurement of progressive tilts that overreach the graduation of the vial. Spacing of the vial divisions is about 0.1 in. and there are four divisions each side of zero.

Vertical Motor-Driven Coolant Pumps

TWO vertical motor-driven pumps, one for immersed installations and the other for "out of the reservoir" installations, have been placed on the market by the Ruthman Machinery Co., Cincinnati.

Features include twin suction intake, accomplished by two separate compartments communicating independently with the lower and upper sections of the impeller. These compartments are of equal size and main-



The pump for immersed installations is shown at right

tain a hydrostatically balanced thrust with increased capacity.

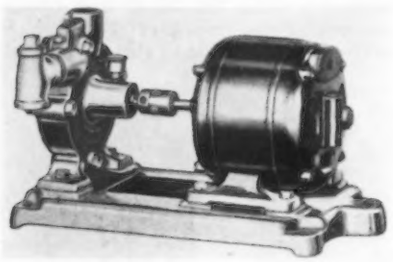
Self-cleaning is accomplished automatically when the flow is partly or entirely throttled. This, together with the fact that no bearings are below or in contact with the coolant and that sufficient clearance is provided for grit to pass through harmlessly, is emphasized as enabling these pumps to give unusually good service where the coolant is loaded with abrasive material.

A reversible impeller housing permits changing the relation of the intake and discharge. The inclosed motor employed has a bowl-shaped disk fan within it, which forces the air upward and outward through perforations in the motor frame. This eliminates damage that might be caused by excess oil from the top ball bearing, as well as from any dirt or chips that may find their way into the motor. A built-in conduit outlet simplifies wiring.

Application of ball bearings to the radial-vane type hydraulic pump built by the Racine Tool & Machine Co., Racine, Wis., is described and illustrated in bulletin No. 202 FE issued recently by the New Departure Mfg. Co., Bristol, Conn.

Turbine Pump for Small Quantities at High Heads

NEW turbine pumps for use where relatively small quantities of liquids are handled, and especially for pumping against high heads, have been placed on the market by Roots-Connersville-Wilbraham, Connersville, Ind. These units, designated as the type T regenerative turbine pumps,



range in capacity from 5 to 300 gal. per min. at heads up to 350 ft.

Features include a patented taper-edge impeller which permits varying the capacity over a wide operating range while the pump is running. There is a slight increase in capacity as the head falls, with a noticeable decrease in power consumption. Both suction and discharge openings are located in the main pump housing to facilitate disassembly for cleaning, without disturbing the pipe connections. Pump speeds are suitable for direct-coupled motor drive. Type T pumps made of corrosion-resisting metals or alloys can be furnished.

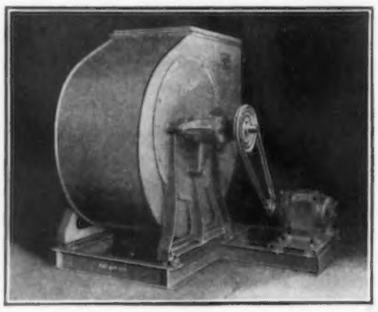
Packless Valve Contains New Features

THE illustration will give some idea of the appearance and construction of the Unitite valve, which has been put on the market by the Hanna Engineering Works, 1765 Elston Avenue, Wicker Park Station, Chicago. It is intended particularly for air, oil or water lines in which pressures as high as 250 lb. per sq. in. are handled. Features include a relation of the valve disks with respect to the seat that keeps the wear uniform and therefore contributes to continued tightness. Also the valve bonnet and the disks may be removed for regrinding without taking the valve body from the pipe lines or disturbing the pipe connections or valve mountings.

To test the wearing qualities, the Hanna company reports crowding the wear of years into a matter of days by subjecting the valve to 300,000 reversals under operating conditions. The bonnet is secured to the body by hardened chrome-molybdenum socket-head cap screws, and an alloy lead gasket seals the joint between bonnet and body. The valve is made in sizes of ⅜ in. to and including 1¼ in. and in straightway, three-way and four-way types.

Floating Base Eliminates Fan Noise

THE Buffalo Forge Co., Buffalo, N. Y., has built a ventilating fan with a silent, floating base for use where quiet operation is important. This floating base, designed to remove the motor hum that normally is picked up and magnified by the fan base and foundations, is emphasized as providing an inexpensive means of insulating a fan and its driving motor from the building foundations. Flexible rubber insulators designed so that there is no metal contact between bolts holding down base and fan provide



the damping effect. It is stated that the rubber used in these insulators is "in shear," which is considered better than "in compression" as the life of the rubber is maintained over a longer period.

Non-Metallic Bearings for General Application

MOLDED non-metallic bearings for general machinery uses have been placed on the market by the Gatke Corpn., 228 North LaSalle Street, Chicago, which heretofore has made bearings exclusively for steel mill service. They are composed of a textile base impregnated with synthetic resins, and are molded under high pressures.

Three different materials, known as Hydrotex, Lubritex and Grafitex, respectively, are offered. The Gatke Hydrotex is for use where bearings run in water or where water is available for lubrication, and the Lubritex bearings are for equipment that is oil lubricated. Gatke Grafitex is self-lubricating and is intended especially for slow moving machinery, where dirt and grit is encountered, or where lubrication is neglected.

These bearings can be molded to dimensions with inserts if required. It is stated that characteristics do not change with age, and no deterioration occurs if machinery is idle or bearings are neglected for long periods. The bearings have a low coefficient of friction and are not affected by ordinary acids, chemicals, solvents, or salt water, or softened by oils or greases. They are furnished for journal diameters from ⅛ to 24 in. and larger.

Variable Speed With Vacuum Tubes

ASYNCHRONOUS motor operating at variable speeds by means of a new type vacuum-tube control was demonstrated in the General Electric test laboratories at Schenectady to the 300 delegates attending the Northeastern district meeting of the American Institue of Elecrical Engineers early in May. The new control, a development of Dr. E. F. W. Alexanderson, consulting engineer of the company, may be used where it is desired to operate alternating-current motors at various speeds with remote control.

An important field promises to be the electric ship. With the new equipment the turbine operates at one speed at all times, and the speed of the propeller motors can be varied by changing the frequency of the current fed to them through the vacuum tube control. Instead of the captain communicating orders to the engine room for a change in speed, the new apparatus makes it possible for him to regulate the speed of the driving motors directly from the bridge.

The equipment demonstrated consists of a 400-hp. motor and 18 thyratron tubes. Power is fed into the bank of tubes directly from a 4000-volt line. The tubes convert this power into different frequencies before it is delivered to the motor. This varying frequency in the current results in varying speeds of the motor.

Midland Barge Co., Midland, Pa., subsidiary of Treadwell Construction Co., same place, has completed construction of a steel agitator dredge for United States Engineer Office, New Orleans, La., in the record time of 120 working days. New unit consists of two steel hulls, each 135 ft. long, 30 ft. wide and 7 ft. deep, with 30-in. dredge pipe, propelled with steam engines of triple expansion type, 1000 hp. barge will be placed in service at Vicksburg, Miss. Contract was secured at about $200,000.

Russian Steel Mill Capacity Is 15 Per Cent Electrified

THAT Russia is going in for the electric furnace in a large way was brought out by C. H. Vom Baur, consulting electric furnace engineer, New York, in a paper he contributed to the recent Montreal meeting of the Electrochemical Society. He reported that there will be available for operation in 1934 a total of 449 furnaces and that 256 of the Heroult type, devoted to steel manufacture, will have an annual capacity of 1,600,000 tons, representing about 15 per cent of the total steel output of Russia. In the United States the electric furnace output of steel ingots has been under 1 per cent of the total and not much over 1½ per cent when castings are included with ingots.

It appears that in the five years ended with 1932 some 205 electric furnaces were built, that 95 are in process of construction this year and that since 1914, 149 furnaces were imported. Of the total of 449 to be in operation in 1934, furnaces of the Heroult design include 86 of 4 tons capacity, 49 of 6 tons, 26 of 10 tons, and one 15 tons and one about twice that size, these last two being among the furnaces scheduled for building this year. About 84 per cent of the furnaces are of the arc type, including Detroit furnaces, but there are induction furnaces of the Ajax-Wyatt type and some high-frequency and resistance aluminum melting furnaces. Many of the furnaces were built according to specifications of Mr. Vom Baur, who superintended operations while he was resident in Russia in 1931 and 1932.

One of the furnaces for use in making steel castings is a 10-ton Detroit mixer, the first of its kind, built last year. It is installed at the tractor plan at Cheliabinsk beyond the Urals and there are to be two more of these mixers besides six 6-ton Heroult furnaces for producing 300 tons of steel castings a day.

The largest size Heroult, already mentioned, is an oval, "with a perfect ellipse and a perfect isotherm, its six 12-in. diameter graphite electrodes being so placed as to conform to these two features."

Will Need to Import Electrodes

At present the Soviets are not making enough electrodes to supply the home demand. Two plants are building to make graphite electrodes. These are scheduled for 2600 tons a year. "Good Russian practice today," says Mr. Vom Baur, "with the best graphite electrodes averages about 6 kg. (13.2 lb.) per ton of steel made. In 1934 their demand for this specialty would be 9680 tons. Unless additional plants are built they would still need 7000 tons, not to mention the graphite electrodes for the Detroit type, say an additional 500 tons."

Three Miguet furnaces have been imported from France. They are at Dnieperstroy, two for ferro-manganese and one for barium aluminate. "Each is single phase, 11,000 kva., stepping down from 36,750 volts to a variable between 25 and 55 volts with 56 voltage steps, made under load. The switching arrangement and transformers are most elaborate and costly. The Miguet electrode is 4 m. (over 13 ft.) in diameter. The outside is an annular ring, made out of close-fitting dovetailed carbon blocks and the inside tamped carbon much the same as in a Soderberg."

Sharp Decline in Concrete Bar Imports

Regulations requiring the marking of foreign reinforcing bars sold in this country have been effective in reducing imports. During the first four months of this year imports of concrete bars into continental United States amounted to 402 tons, compared with 12,524 tons imported in the corresponding period in 1932.

Scrap Institute to Plan Code of Competition

The scrap iron industry will be prepared to consider the advisability of adopting a code of fair competition for the industry, under the terms of President Roosevelt's Industrial Control Bill, when it meets for its 5th annual convention in Chicago during the week of July 3, it was stated by Benjamin Schwartz, director general of the Institute. The annual convention will have before it the proposed codes, if any, of the American Iron & Steel Institute and other trade associations operating in the steel industry, as well as the experiences of associations in other basic industries. Mr. Schwartz stated that the Institute of Scrap Iron & Steel was one of the first trade associations to adopt a code of business practices in cooperation with the Federal Trade Commission in 1929, and that it is likely that this code will be modified and enlarged to include the new powers given to trade associations to cover such subjects as price stability and unfair competition and marketing practices.

The cooperation of the Government, under the Industrial Control Bill, may be asked to check direct deals between producers and consumers of scrap, because it retards the reemployment of thousands of people in the scrap iron industry, and because it involves the element of unfair competition, it was indicated by Director Schwartz at a meeting of the Boston Chapter of the Institute held in Boston, Thursday, June 1.

Japanese Steel Industries Maintain High Rate

Japanese iron and steel industries are continuing operations at a high rate and reports indicate that such activity is anticipated for the next six months, according to a report from Commercial Attaché H. A. Butts, Tokio.

Plants engaged in work for the Army and Navy are continuing to install machinery and electrical equipment, with consequent benefit to local manufacturers and American firms who are well established there with contacts which enable them to secure the business. Prices continue to remain upon a satisfactory basis, except for pig iron, which has not improved as much as the other iron and steel products.

It is reported that the Government has authorized the taking over by the newly formed Showa Steel Works of the Anshan operations in Manchuria. The new plant is to be built in Anshan, and according to reports, will produce pig iron, steel ingots and bars and various other steel materials.

Production of the plant is to be largely for consumption in Manchuria and export to China and the South Seas. Such products as may be shipped to Japan will be largely in order to make up for any deficiency in the domestic production.

Stanley Works to Make Line of Steel Toys

The Stanley Works, New Britain, Conn., has begun manufacture of a new line of colorful steel toys called Stanlo, comprising construction sets from which buildings, automobiles, trolley cars, boats, cranes, bridges, towers and models of many other machines and structures can be built. Seven or more different sets of parts will be offered. These new toys will be exhibited on the Enchanted Isle of the Century of Progress Exhibition in Chicago and will be ready to retail about Aug. 1. Most of the work on the product will be done on automatic punch presses. It is expected that a considerable quantity of steel will be used.

Murray Corpn. Develops Steel Beer Barrel

A rustproofed steel beer barrel has been developed by the Murray Corpn., manufacturers of automobile bodies.

The barrel is formed of two sections. One is the inner container, which is built up by welding together two half sections. The other is a strong outer shell which is solid seam welded to the inner vessel so as to form air spaces at either end. These provide the insulation feature. Two wide beads are formed around the adjacent rims of the outer shell to form raised runners on which the barrels may be rolled without possibility of damage to the inner container. These runners fit standard conveyor systems. The Murray barrel also simulates the old wooden beer barrel by having deep chimes formed in the ends of the outer section. These permit easy gripping for handling.

The barrels will be delivered pitched ready for use. The inner surface of the container is made porous by a special process so that the pitch will adhere tightly to the steel surface. Weight is approximately half that of the ordinary wooden barrel.

Wetherill Medal Awarded To Koppers Company

The Franklin Institute of Philadelphia, on May 17, conferred a John Price Wetherill medal on The Koppers Co., of Pittsburgh, "in consideration of the development of systems for the liquid purification of gases; the success of which is evidenced by the number of such installations in regular use."

Practically all manufactured gas, whether secured from coal or oil, and much natural gas, contains hydrogen sulphide. Before this gas can be distributed for domestic use and for many industrial processes, it must first be freed from this impurity. The usual method of purification, by the use of iron oxide in steel or concrete boxes through which the gases are passed and the sulphur removed by combination with iron, involved large ground area, expensive structures, the necessity for frequent changes of the oxide and arduous labor.

The Koppers Research Department, working at the Mellon Institute and at The Koppers Co's. plants, developed a purification process using a liquid absorber. In this process the hydrogen sulphide is first absorbed, then removed from the absorbing solution by actification with air. This air, containing the hydrogen sulphide, is either discharged into the atmosphere or utilized through combustion in boilers, gas producers, or coke ovens. The original experiments having been made at the plant of the Seaboard By-Product Coke Company, a subsidiary organization and the original plant having been built on its property, the process received the name "Seaboard Process".

The general principle was disclosed in a patent issued to David L. Jacobson of The Koppers organization. Additional patents were granted to C. J. Ramsburg, F. W. Sperr, Jr., and E. H. Bird.

Later modifications were made in the process whereby sulphur could be recovered from the hydrogen sulphide. This sulphur may be substituted for brimstone for all ordinary purposes and has special value for pharmaceutical and insecticidal purposes due to its finely divided state.

Up to Jan. 1, 1932, The Koppers Company had installed 67 plants in America, with a purifying capacity of 533,000,000 cu. ft. of gas per day. Plants in Canada, France, Germany and Japan had a daily capacity at that time of 84,000,000 cu. ft.

Standards Bureau Issues Metals Specifications

A new encyclopedia of specifications for metals and metal products has just been issued by the Commerce Department's bureau of standards.

The publication contains standards and specifications in this field prepared by more than 80 nationally recognized organizations.

The encyclopedia contains ten chapters covering: iron and steel; iron and steel manufactures; ferroalloying ores, metals and metal manufactures; aluminum, antimony, bismuth, cadmium, and cobalt; copper, brass, and bronze; lead, mercury, and nickel; precious metals, metal jewelry and plated ware; clocks, watches, and dials; tin and zinc; and miscellaneous ores, metals, alloys, and metal manufactures.

Copies of the new publication may be obtained from the Government Printing Office at $3.00 each. The price to foreign countries is $4.00.

Italian Industries to Cut Work Hours

Italy's efforts to meet the unemployment problem have been given added impetus recently by an order from the General Confederation of Industry calling upon Italian industries to reduce the number of working hours instead of cutting personnel and to take on added personnel in place of permitting overtime work, according to a report from Commercial Attaché Mowatt M. Mitchell at Rome to the Department of Commerce.

Combination Oil-and-Gas Burner Made by B. & W.

The Babcock & Wilcox Co. has announced a combination oil-and-gas burner in which are combined the features of the well-known B. & W. mechanical atomizing oil burner with an efficient method of burning gas. The gas is broken up into small streams and is discharged at right angles into a venturi throat through which the air for combustion passes, insuring complete mixing and rapid combustion. The burner is made in heat-liberation capacities up to 70,000,000 B.t.u. per hour per burner using natural gas.

Imperial Institute Issues New Edition of "Lead"

The second (1933) edition of "Lead" has been issued by the Imperial Institute, South Kensington, London. The book has been entirely rewritten, the present edition comprising 253 pages as compared with 95 in the first edition.

It may be obtained either from the Institute or from H. M. Stationery Office, London. The price is 4s.

New Screen Metal Resists Corrosion

Manufacturers of wire cloth have begun the production of a new type of screen for household purposes, which, it is indicated by a long series of tests in the laboratory and under actual service conditions, will resist discoloration and corrosion. It requires no paint and is said to eliminate up-keep and maintenance cost.

The screen is made of "Inconel," a new alloy containing approximately 80 per cent pure nickel, 12 to 14 per cent chromium, and about 6 per cent iron. Originally developed for use in the construction of certain items of dairy equipment exposed to the corrosive action of lactic acid and brine, it has been found to be almost entirely proof against staining, corrosion, or other deterioration from atmospheric conditions. It is silvery white in color and when drawn into wire it possesses tensile strength more than sufficient for the requirements of wire fabric.

Samples of screening made of "Inconel" have been exposed to salt water atmosphere, industrial chemical discharges and other tests since July 31, 1931. These samples to date show no trace of discoloration, no corrosion, and no leaching.

How the Industrial Recovery Act Will Be Administered

By L. W. MOFFETT
Resident Washington Editor, The Iron Age

WASHINGTON, June 13.—It is proposed to operate the Industrial Recovery law as nearly as possible through voluntary action of industry.

With this end in view, General Johnson asked for and received pledges from seven basic industries to cooperate with the administration. These industries include iron and steel, oil, textile, coal, and automotive. They are estimated to represent 70 per cent of the industrial employment of the country. With these industries back of him, General Johnson expressed assurance that others would fall into line. He made it clear that he expects that there will be little, if any, necessity for invoking the licensing provision to compel recalcitrant groups to join in the codes of fair trade practices. Nevertheless, he insisted, with the support of President Roosevelt, that the licensing section be incorporated in the act. It is the contention that the licensing section should be carried "in the hip pocket" in the event it should have to be used.

Codes being filed and prepared follow the suggestion of General Johnson. They generally provide for the short week, the hours varying with different industries, and increased wages. The increases also range widely. There are some that carry a boost of 50 per cent.

Despite the difficult position in which industry is placed in yielding to the desire of the administration that wages be increased and price increases deferred, this is being done. There is real perplexity among some industries as to how the lag of price increases behind wage increases is to be met. Already making little or no profit, and often suffering considerable losses, the problem is a serious one for industry generally. The point of the administration is, however, that wage and employment increases are absolutely necessary first. They must be increased, it is contended, to build up the desperately needed gain in purchasing power. Unless wage increases come first, so the administration reasons, the purpose of stimulating purchasing power is defeated for the reason that if wage and price advances were made simultaneously the higher price levels would absorb the higher wages. The view is not shared by many industrialists but they are accepting it to a greater extent than possibly had been expected.

Price increases obviously are to follow, at least in industries which have not already come up to the levels that will be forced by greater wages, greater costs of raw materials and shorter working time. The "spread the work" campaign, so it is maintained, failed to accomplish its purpose because it had the fault of not providing increased purchasing power by increasing wages. It also provided nothing for increased prices. The result, it is pointed out, has been a continued and even a growing disparity between two curves—the curve of total production by volume and value and the curve of purchasing power, reflected by wages, dividends, etc. The administration vigorously is urging that this disparity must be overcome. Unless it is predictions are made that a crash is inevitable. The forecast is made to emphasize the importance of the point and is not meant as an alarmist statement. It is cushioned considerably, however, by the confidence expressed that industry, business and the public generally will go along with the industrial recovery program. There are manifestly those who doubt that this tremendous government control over industry, an unprecedented swing from the traditional individualistic economic system of the country, will operate so effectively as its sponsors say it will. But they are going along with the administration, realizing the complications, ramifications and what to many seem to be almost insurmountable difficulties in the intricate world of industry, business and finance with their multitude of economic and technical problems.

Will Favor Open Price Associations

Heretofore the object of scrutiny for law violations, the administration now has turned definitely to the open price trade associations to assist it in working out the tasks that lie ahead. These associations will be asked to gather information from their respective industries as to costs, sales and prices at which they were made. This information will be supplied to the administration. The object will be to keep prices under control. Likewise it is determined to keep a rigid check upon the price cutter. The "chiseler" becomes a violator of the law. For it is decidedly the purpose of the administration to see that sales are made at profitable prices. The drive against the "sweatshop" and the "chiseler," terms often used by officials in charge of the act, apparently will be unremitting.

Physical Set-Up of Control

Turning to the physical set-up of the administration, it has been made clear that it will be something like the following:

At the head will be the administrator. He will have complete authority and assume full responsibility for operation of the law. There will be no voting board to determine policies. Voting is held to offer too much opportunity for splits and delays, and speedy action is held to be extremely vital.

Under the administration will be a labor board and an industrial board, made up of men prominent in each field. Each board will pass upon codes and disputed points, reflecting the views of industry and labor, with final authority as to approval, modification or disapproval of codes resting in the President through his administrator, who will represent the public. Between these boards will be a coordinating body of government agencies.

Under these boards will be so-called department staffs. They will be made up of men representing the major industries on one side, and labor, organized or unorganized, on the other side. Contacting with the administrator will be an industrial "adept," who will be able to advise him as an expert of the merits of points that are raised.

It is understood that codes presented by trade associations will be presented by a small committee representative of the majority of industries affected and also of a minority in the industries, if there is any, which may or may not belong to trade associations. The "industrial adept," who must not have any interest whatsoever in any industry, together with a representative of industry and labor, will pass upon codes before they go to the administrator. Hearings will be granted those who may dissent from proposed codes before final action is taken.

There are three fundamentals that

will be requisite to approval of agreements. First, they must be fair to the public; second, they must be fair to the parties making the agreement; third, they must give protection for the agreeing parties against recalcitrant groups, even if it is necessary to compel enforcement through the licensing provision.

It is the hope of the administration to return 3,000,000 to work under the industrial section and 1,000,000 under the public works section by Oct. 1. While it was not offered as an accurate figure, nevertheless it is hoped to also place an additional 3,000,000 to work through "sympathetic activity" in "occupational channels" affected by work and purchasing power built up under the industrial section. Thus under this calculation 7,000,000 would be reemployed. It is estimated that for every $1,000,000,000 spent under the public works section, which carries an appropriation of $3,300,000,000, work will be provided for 1,000,000. Projects for immediate action have been listed in order to engage this number by Oct. 1.

Wage Scales Will Vary Geographically

The recognition of different wage scales for different sections of the country was recognized by the Senate in its provisions covering geographical groups. Sections of organized labor are opposed to labor provisions because of the fixing of minimum rates. They contend they will mean maximum rates also and prevent labor from demanding higher wages.

The foreign competition control provision as put in by the Senate and finally enacted is held by many to be cumbersome and to involve long-drawn proceedings. There are many who doubt also that the President will make use of it unless foreign competition proves absolutely and broadly destructive. This is based on the seemingly excessive solicitude by the State Department in particular for doing nothing that would "disturb foreign relations." It is especially marked at this time because of the London Economic conference.

Foreign Competition Provision

The foreign competition control provision is to the effect that upon complaint to the President that articles are imported into the United States to the detriment of any industry with respect to which a code of fair competition is in effect, resulting in unfair methods of competition in the United States, the President may cause an investigation to be made. If, after public notice and hearing, the existence of unfair methods of competition shall be found, the President may embargo the products. The refusal of entry is to continue until the President finds the conditions which led to refusal no longer exist.

The simpler the codes the more desirable they will be for Administrator Hugh S. Johnson and his staffs. It is also desired that they avoid some points at which the administration is shying, including direct price fixing. Price fixing by implication cannot be avoided. Many "sample" codes, some extremely complex, have been sent out by different organizations, but the administration apparently has not nailed the matter down to a point where a "sample" or model code may be prepared, though fundamentals might be outlined as common to all industries and businesses.

Points to Be Covered in Codes

Points that have been emphasized as necessary in a code include provisions for fair competition, hours of employment, minimum wages, plant capacities, policies and methods of cost accounting because of their bearing on prices based upon "average costs" or some other means, pointing to a uniform system of cost accounting.

A strong guide no doubt will be afforded when the administration takes action toward rules and regulations and possible instructions. It is realized, though, that even these cannot from the outset cover all queries that will arise from the sweeping provisions of the new law. Its administration will determine its advantages or disadvantages.

Initiative Not to Be Discouraged

Much in the way of possibilities is seen theoretically but will not be seen in reality, it is believed, for General Johnson has said it certainly is not his purpose to be "czaristic." For instance, the point has been made that new companies could be barred under the terms of the licensing provision, whose constitutionality has been challenged. But it is not thought at all likely such a power would be attempted. Nor will anything be done to discourage research, initiative, new methods, invention and industrial progress generally, it has been stated. This point has been made in reply to contention that government control means paralysis of initiative of industry. It is also declared that existing contracts at prices which may be lower than those that will prevail once the law is put into operation generally will not be disturbed unless there is proof that they were made to evade the law. Proof of evasion is not held to be likely to be uncovered. It is a question also whether the administration could apply the law retroactively. No provision of the kind is carried in the act. In some cases possible adjustments of contracts to a higher price level may be suggested, it is reported.

It is understood that some codes already passed upon estimate average costs for given industries in given geographical areas and leave to the administrator the determination of a fair price increase. In view of the attitude toward direct price fixing it is not thought such authority will be assumed by the administration except by inferentially informing industries that it would not object to the stabilizing of prices on a cost basis. The fixing of costs raises the question as to their effect on the high cost producer. Unless the prices resulting were much above the cost of the low cost producer the former would suffer. It has been stated, however, that some plants might be "rubbed out." This, it is stated, would result in any event under present economic conditions whether the government did or did not control industry. The government will not put an "umbrella over inefficient plants."

Should Encourage Improvements in Methods

Senator Wagner has said the law should promote research, improvement in methods, etc. Because of this it is clear that efficiency in production still is to be considered an important factor. This has turned to the suggestion that operation of this plan should develop heavy requirements for modern metal working machinery and equipment generally.

Minimum wages apparently will apply to low-pay workers, including "white-collar" workers, perhaps not to skilled workers, though the point appears to be debatable. Clear definition as to a fair minimum wage is expected to be given by Frances Perkins, Secretary of Labor. Miss Perkins' definition may follow her idea expressed heretofore which calls for a "decent living and not mere subsistence."

From 30 to 36 Hours per Week

Hours of work no doubt will vary with different industries, perhaps with a range from 30 to 36 hr. per week and generally 6 hr. a day, where manufacturing processes will permit.

Seeing that codes of fair competition are adhered to apparently will be left to trade associations themselves. Such a broad group as iron and steel and metal-working machinery will require various codes for various units and different geographical areas.

Though a great deal has been said about the necessity of enactment of State laws to unify them with the National act, this is not generally considered to be important. Moreover, it would be impracticable from a point of time. The act does affect intrastate business where it reacts unhealthily upon interstate commerce in the same industry groups. This can be expanded to cover a broad ground.

WASHINGTON, June 13.—The Interstate Commerce Commission has refused to permit railroads to increase the rate on scrap iron in carloads from Lynchburg, Va., to Pittsburgh from $5.10 to $6.17 per gross ton.

OFF THE ASSEMBLY LINE

THIS WEEK IN THE AUTOMOTIVE INDUSTRY

Steel Releases Run Ahead of May as Motor Car Output Spurts Upward

DETROIT, June 13.

BY rail, truck and water, steel is moving into the Detroit district in undiminished volume to meet the current needs of the automobile trade. In fact, demand for steel intensified rather than relaxed the past week. This is an indication that motor car production is being maintained at or near the May level. Steel releases from southern Michigan users actually are running ahead of those in the corresponding period of last month; pig iron shipments likewise are better than in May. The steel trade is convinced that the flow of automotive tonnage will remain at a fairly high level until at least the middle of July. The trend of motor car manufacture gives support to this belief.

Sales figures from dealers throughout the country show that June has brought a reversal of the usual seasonal decline and that retail deliveries this month may set a new high mark for the year. To avoid overproduction it is the practice of several automobile companies to establish relatively low tentative schedules for assemblies at the beginning of the month and later revise them upward according to the dictates of retail demand. Adhering to this practice, some of the more important car manufacturers entered June with relatively modest plans for the month and in the past week have found it necessary to expand their operations. In a few instances, notably Plymouth and Pontiac, new high points for the year will be attained. The former, having completed expansion of production facilities at its Mount Elliott Street plant, is now in a position to make more than 40,000 cars a month; in June it expects to turn out 36,000 cars, the largest monthly total in its history. Despite Plymouth's fast production pace since May 1, it has on hand today unfilled orders for 20,000 cars. Pontiac assemblies this month will be more than 12,000 units, the largest number since May of 1931. This represents a gain of 2000 units over the schedule approved three weeks ago. Pontiac's sales last month exceeded assemblies by several hundred units and was 76 per cent greater than sales in May, 1932.

Gains Recorded Over 1932 Production

Chevrolet is aiming at a goal of 65,000 cars in June. Its domestic retail sales last month, at 65,761 units, were the largest since June, 1931. This compares with 48,210 units in May of last year and 53,936 in April of this year. Of significance was the constantly growing margin of gain in each of the three 10-day periods in May as against similar periods a year ago. In the first period the increase amounted to 22 per cent, in the second period 34 per cent and in the third period 48 per cent. In the first five months of this year Chevrolet's retail sales totaled 226,388 units, as compared with 209,792 in the like months of 1932. Chevrolet bought sizable tonnages of steel the past week for its local gear and axle and forge plants and also for its Flint factory, covering part of its July requirements. Additional purchases are anticipated in the next two weeks.

Buick's May output was 5015 cars, compared with 2913 in the same month of last year. Its program for June is approximately the same as in May, with operations continued six days a week. Oldsmobile will make 4000 to 4500 cars this month. Combined assemblies of Studebaker and Rockne will be 5000 cars, or 1000 more than the original sales forecast called for. The Studebaker Corpn. now has 5800 people working in its South Bend plants. Hudson-Essex is building about 2500 cars a week. Dodge will manufacture over 10,000 cars in June, and De Soto and Chrysler together should account for another 5000. In the first five months of 1933 Dodge shipped 27,362 cars, or more than in the entire year of 1932. Packard is expected to make 1000 cars, as against 624 in May. Cadillac also should come near the 1000 mark; in fact, Cadillac has been pushing production on its V-12 line because of a shortage of cars among dealers. The recent upward revision in production by the majority of manufacturers makes it a toss-up as to whether May or June will be the peak month of the year. The decision apparently rests with the Ford Motor Co. and what its assemblies will be this month compared with last. This is extremely hard to gage, because operations at Rouge often are not a measure of assemblies. For instance, Rouge is said to have a program of 42,000 units for June, but cars coming off the lines at branch assembly plants may be considerably more than that figure. It is known that some branch plants have had a considerable bank of parts, which was built up earlier in the year. It is considered unlikely that the Ford Motor Co. will resume operations of its open-hearth furnaces in the near future, despite the fact that recently some scrap has been stored rather than sold. Ford's steel finishing mills are operating intermittently. Pig iron stocks are estimated at about 200,000 tons.

Steel Buying Is Not Speculative

Although steel releases the past week from the automotive trade have been unusually heavy, steel companies are of the opinion that most, if not all of the tonnage is required for immediate fabrication and does not represent speculative buying. Automobile makers have inquired for third quarter and in some instances for the remainder of the year, but steel mills are firm in their intention not to quote beyond June until future production costs as determined by the course to be taken under the Industrial Recovery Act are known. It is understood that Buick and Chevrolet have asked parts supplier to protect them at current prices through the third quarter, or virtually until the end of the life of present models, and Chrysler is seeking protection over the remainder of the year. Foundries furnishing automotive castings are operating overtime, a few of them 24 hr. a day. The Chrysler foundry continues on a basis

of 24 hr. a day. Chrysler Corpn. has completed the removal of De Soto production to its Jefferson Avenue plant.

Because of the brisk demand for trucks for hauling beer and the considerable profit from this trade, steel mills are having difficulty in getting sufficient trucks to transport steel into the Detroit district. Truck movement of steel to Detroit has been particularly heavy from northern Ohio, especially from Cleveland. However, steel is being trucked in considerable quantities from the Valley and the Pittsburgh and West Virginia territories. At least one trucking company is operating on a schedule of 12 to 14 hr. delivery from Pittsburgh to Detroit.

May, with estimated registrations of 150,000 cars, was the first month since October, 1929, when passenger car sales exceeded those in the same month of the previous year, according to R. L. Polk & Co. Commercial car and truck sales turned upward sharply, the total being estimated at 23,200 units, compared with 17,301 in April and 18,696 in May of last year.

Willys-Overland has been authorized by the federal court at Toledo to make an additional 2000 trucks for the International Harvester Co., assuring a continuation of operations until September.

May British Steel Output Best Since July, 1930

LONDON, ENGLAND, June 13 (*By Cable*).—British steel and pig iron productions both took big jumps in May. The steel output was 599,600 tons, compared with 577,700 for March which was previously the largest month's production for this year. The record of May has not been exceeded since July, 1930.

Pig iron production was 339,900 tons, which was the largest output for any month since May, 1931.

Monthly totals for 1932 and 1933 are shown below:

1932	Pig Iron	Steel Ingots
Jan.	332,400	429,700
Feb.	318,100	480,600
March	335,600	462,800
April	316,900	433,300
May	315,300	416,900
June	311,400	459,300
July	292,600	430,300
Aug.	259,400	361,500
Sept.	260,400	430,300
Oct.	275,600	438,500
Nov.	267,700	473,800
Dec.	284,500	430,400
	3,569,900	5,247,400
1933		
Jan.	286,600	444,400
Feb.	270,800	482,700
March	332,200	577,700
April	324,700	513,300
May	339,900	599,600

R. L. Batteiger Co., 1642-44 Widener Building, Philadelphia, has purchased the remainder of the partially dismantled plant of the American Horseshoe Co., Phillipsburg, N. J.

... PERSONALS ...

W. F. KURFESS, manager of the mill department of Joseph T. Ryerson & Son, Inc., has been appointed assistant vice-president of the company. M. J. HARTIGAN succeeds Mr. Kurfess as manager of the mill department. Mr. Kurfess is a graduate of Purdue University and entered the structural engineering department of the Ryerson company in 1912.

W. F. KURFESS

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FREDERICK L. PIERCE has resigned as vice-president, Cutler-Hammer, Inc., Milwaukee, but remains on the board of directors. He has not been active in the business for some time past. HENRY F. VOGT, treasurer, has been elected a vice-president, continuing also as treasurer.

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A. C. LEVINE, formerly assistant district manager, has been made district manager at Chicago for the Truscon Steel Co., succeeding the late Peter M. Louwerse.

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M. J. SCHMITT has become associated with the Ex-Cell-O Aircraft & Tool Corpn., Detroit, as sales representative in the Milwaukee district with headquarters at 1501 South Eighty-third Street, West Allis, Wis. He will handle the products of the Continental Tool division as well as those of the Ex-Cell-O company.

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M. LOWENSTEIN, of Lowenstein Brothers, Newark, has been elected president of the New Jersey chapter of the Institute of Scrap Iron and Steel. Other officers elected include the following: RICHARD BONOMO, of Schiavone & Bonomo Brothers, Jersey City, vice-president; MURRAY KUNIN, Jersey City, secretary-treasurer; JAMES J. BRADY, of Federal Iron & Metal Co., Newark, chairman of the executive committee.

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C. K. DAVIS, formerly general manager of the R. & H. chemicals department of the E. I. du Pont de Nemours & Co., Wilmington, has been made president of the Remington Arms Co., Inc., to succeed SAUNDERS NORVELL, who remains on the board of directors.

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FRANK L. SHANTS, who has been assistant manager of sales, has been appointed manager of sales of the Philadelphia office of the Lukens Steel Co., Coatesville, Pa., succeeding his father, G. T. Shants, who died several years ago and with whom he was associated.

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L. E. JEANNERET, special representative of the Babcock & Wilcox Tube Co., New York, is acting temporarily as district sales manager of the company's Detroit territory, replacing J. E. POLHEMUS, manager.

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B. M. STUBBLEFIELD, superintendent of the Campbell works blast furnaces of the Youngstown Sheet & Tube Co., Youngstown, was elected president of the Eastern States Blast Furnace and Coke Oven Association, at the Association's annual spring meeting, at the Edgewood Country Club, Pittsburgh, on June 9. He has been vice-president of the organization. C. P. CLINGERMAN, superintendent Carrie furnace, Carnegie Steel Co., Rankin, Pa., who has been secretary-treasurer of the Association, was named vice-president. JOHN C. MURRAY, assistant general superintendent of the Eliza furnace, Jones & Laughlin Steel Corpn., Pittsburgh, was named secretary-treasurer of the group.

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R. J. WHELAN, president, Ohio Nut & Bolt Co., Berea, Ohio, has been elected president of the American Institute of Bolt, Nut and Rivet Manufacturers, succeeding GEORGE S. CASE, president, Lamson & Sessions Co., Cleveland. Mr. Case and O. H. REINHART, Milton Mfg. Co., Milton, Pa., were added to the executive committee succeeding A. D. MORRIS, Bayonne Bolt Corpn., Bayonne, N. J., and THOMAS E. KILBY, Kilby Car & Foundry Co., Anniston, Ala.

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A. E. R. PETERKA has been appointed development and sales engineer of the Lamson & Sessions Co., Cleveland. Formerly he was development and research engineer for the Western Electric Co., Chicago, and before that assistant superintendent of the Central furnaces of the American Steel & Wire Co., Cleveland.

National Metal Trades Association Declares for "Open Shop"

WILLINGNESS to cooperate in measures designed to foster national industrial recovery formed the keynote of the 35th annual convention of the National Metal Trades Association, held June 8, at the Congress Hotel, Chicago. The association placed itself squarely on the foundation of the open shop. It was urged with regard to the Industrial Recovery Act that judgment of the act as a whole be reserved but that the fight be carried on to put this bill in a form acceptable to industry. The association in no manner is withdrawing its cooperation from the administration at Washington. In fact, it is actively throwing all of its influence in the direction of industrial recovery and it makes only the one reservation that since the bill is not yet enacted each member analyze the situation and refrain from being stampeded. Then if and when the act becomes law the members are to work with the national organization on a united front.

J. D. Cox, Jr., Cleveland Twist Drill Co., Cleveland, president of the association, pointed out that the metal trades are today confronted with legislation which will force adjustments that in many instances are extremely radical, and which may necessitate setting up a structure entirely foreign to traditional concepts. He referred to the Industrial Recovery Act as the most far-reaching development in regard to industry that has occurred in the history of the association. The law in its present form will place all industry under governmental control, arm organized labor with a powerful weapon and materially restrict the freedom of industrial management through centralized governmental control.

He stressed the fact that this Bill by its own terms is supposed to be a temporary measure for two years only but there can be little doubt that if it is successful, even in a minor degree, in obtaining the end sought, it will become permanent.

Wait for Codes Until Bill Becomes Law

Mr. Cox stated that the association has specifically advised its members of the inadvisability of formulating fixed codes until the act has become a definitely established law. When the bill is passed, there will be ample time for organization of groups and formulation of codes, because the first application of these acts will be to the basic industries covering a few of the simpler aspects. Following this the other groups will come into the picture, and will then be in a position to act more intelligently.

President Cox reported that industry seems to have felt the influence of improving conditions. In the commercial field where consumable commodities predominate the signs of improvement are quite definite. In the realm of capital equipment and machinery lines, except for steel, the signs are less distinct. In the field of labor, especially employment, the improvement is as yet meager, but sufficient to create a very hopeful frame of mind.

Have Been Few Labor Disturbances

He reported relatively few labor disturbances in the metal trades industry during the past year except for Communist inspired troubles in Detroit.

Speaking on the subject of "Reflation or Regimentation," Virgil Jordan, president, National Industrial Conference Board, stated that the outstanding fact to bear in mind in considering our present position is that what we have experienced is not an ordinary business depression or the normal down-swing of a business cycle, but a fundamental change in the price level or in the value of money. Such changes have occurred twice before in our history following periods of major wars, and have always been associated with war-time prices, or with sudden changes in the supply of money and credit.

The depression, said Mr. Jordan, has brought us quite clearly to a new stage, and possibly to a new epoch in the industrial and political history of the nation. We are face to face not only with natural and human questions whether we have reached the end of the deflation process and started on the road to recovery, but with the far more important and profound question from the long-run point of view as to which road to recovery we are taking and where it leads.

Three Roads to Recovery

Mr. Jordan then outlined the three roads to recovery. The oldest and most familiar of these is the painful path of gradual readjustment through individual effort.

The speaker thought this to be the most dangerous and difficult of the three roads because readjustment of so vast and complex an economic organization as that which we have developed would involve so prolonged and painful a process as to raise the serious possibility of grave social and political disorders.

One of the other two roads is that of deliberately devised and consciously controlled reflation, which means an effort on the part of the government to raise and maintain the average level of prices in this country to a point which will permit obtainment of service and sinking fund charges on long-term fixed money obligation without crippling consumption and production, repudiating or recasting contractual obligations and relations, and discouraging new investments.

The third road is that of rigid regimentation and direct control of production and trade by governmental authority. The cooperation of groups may be enlisted in this process, but the ultimate authority would remain in the hands of government and the final arbiter of individual action will inevitably be some public official. Individual enterprise and activity must be regulated in some fashion in relation to that of others. Prices of goods and services must be fixed either directly or by agreement and given the force of law, while production and investment must be controlled or rationed in relation to markets, and demand to some extent on the basis of external and arbitrary judgment of some accepted authority other than the individual, or even the group directly concerned.

In the last analysis, said Mr. Jordan, we must constantly recognize what history and human experience universally attest, that the highest degree of human advancement and prosperity has always been obtained where a premium has been put upon enterprise and individual freedom rather than upon security and order, and that where security and order become the primary objective, there inevitably results a society which is more static and less rapid in its developments than is the case otherwise.

"The Goose Complex in Government"

"The Goose Complex in Government" was the subject of an address by James Lincoln, president, Lincoln Electric Co., Cleveland. Government under present leadership, he said, is undertaking to regulate the value of money; repudiate loans, give jobs to the unemployed, regulate wages, hours, conditions of labor; unionize all industry; regulate profits, tax its citizens beyond the utmost limits ever heard of before; design and build millions of dollars worth of new construction of very doubtful value; remonetize silver; take over the rum running from the bootlegger, etc. It is demanding that the average citizen work for it during five months of the current year—maximum hours and minimum wage laws not applying since we are not paid for our work.

Railroad Business Improving

Paul Shoup, president, Southern Pacific Railway, started his address by stating that industry is entering perhaps on an experience which the railroads have had for a good many years. He likened the governmental action to a person attempting to cross a swiftly flowing stream by means of an uncertain suspension bridge. He warned that men change but the spe-

cific words of an agreement do not and industry should dwell specifically on every word of new legislation. Rise of prices alone is not an indication of the return of prosperity and we have never come out of any depression by ways and means that can be evaluated or measured.

In 1929, said Mr. Shoup, May car loadings increased over March but in the next three years the trend was reversed. In 1933 the trend was the same as in 1929 but the increase was the greatest in the history of the railroads.

Dr. Otto P. Geier, Cincinnati Milling Machine Co., stated the belief that efforts at unemployment insurance will be accelerated as the government takes more interest in the social side of conditions. He used results in Germany to illustrate the failure of this insurance policy. There after only a few years of operation dues were doubled, benefits were halved and less than 12 per cent received what had been promised by the government, while 22.3 per cent were on emergency relief, 41.9 per cent were on welfare relief and 24.4 per cent were given no assistance.

The following resolutions were adopted by the association:

WHEREAS, the National Metal Trades Association, composed of 711 large and small metal working manufacturing companies, and whose objectives are as stated in its constitution:

(1) To secure and preserve equitable conditions in the workshops of members for the protection of both employer and employee.

(2) Investigation and adjustment of questions arising between members and their employees which may come within the jurisdiction of the Association.

AND WHEREAS, The National Industrial Recovery Act deals with the relations between employer and employee:

THEREFORE, BE IT RESOLVED, That the membership assembled in its 35th Annual Convention do hereby reaffirm adherence to these principles; and

BE IT RESOLVED, That its membership stands unqualifiedly for the Open Shop. Each member is today and has been throughout its thirty-five years of continued existence ready to deal individually or collectively with its employees regarding matters of employment, and is opposed to conducting negotiations on such matters with individuals not in its employ or with representatives of outside labor organizations; and

THEREFORE, BE IT FURTHER RESOLVED, That a copy of this resolution be sent to the President of the United States, the Chairman of the Finance Committee of the Senate, the Chairman of the Ways and Means Committee of the House of Representatives, the President of the United States Chamber of Commerce, and the President of the National Association of Manufacturers.

The following officers were elected: Jacob D. Cox, Jr., Cleveland Twist Drill Co., Cleveland, president; Alexander Sellers, Wm. Sellers & Co., Inc., Philadelphia, vice-president; Chas. H. Strawbridge, Goodman Manufacturing Co., Chicago, second vice-president, and John W. O'Leary, Arthur J. O'Leary & Son Co., Chicago, treasurer. Councilors for two years: H. S. Chafee, Builders Iron Foundry, Providence; Roe S. Clark, Package Machinery Co., Springfield, Mass.; Henry W. Johnson, De Laval Steam Turbine Co., Trenton, N. J.; K. T. Keller, Chrysler Corporation, Detroit; J. R. Kinney, Kinney Manufacturing Co., Boston, and A. H. Tuechter, Cincinnati Bickford Tool Co., Cincinnati.

British Pig Iron Active, Cartel Regulations Prove Disturbing

LONDON, ENGLAND, June 13 (*By Cable*).—With increasing activity in British pig iron, there is talk of restarting more blast furnaces in anticipation of demand.

Rollers of semi-finished steel are in better position, because of the decrease in imports from the Continent, but heavy mills still need tonnage in ship specifications.

Tin plate continues firm in price, following the recent rise in the tin market, although as yet business is only moderate in volume. Canada, however, has recently placed some orders for tin plate. The Welsh tin plate production was adversely affected by the hot weather last week and output is now at 60 to 65 per cent.

The European Raw Steel Cartel has made a number of changes and additions to the prices named last week. In addition to billets, steel bars and angles, which are now the same as quoted in our table of Continental prices (denoted by *), the prices thus far established by the cartel are now as follows:

Ingots	£2	5s.	
Sheet bars	£2	8s.	
Beams	£2	16s.	6d.
Plates, ¼ in. and up	£3	18s.	6d.
Plates, 3/16 in. and 5 mm.	£4	1s.	
Sheets, ⅛ in.	£4	6s.	
Ship plates	£4	10s.	

The Continental market is disturbed by the new regulations which provide that the selected merchants must each post guarantees of £1,000, gold, against fines which would become collectible if material sold by the sales offices were diverted from destination or sold contrary to agreement. Merchants operating under the cartel agreement are also required to buy steel only from the established sales offices. It is also required that they state destinations, that they refrain from selling at more favorable terms than offered by the sales offices and that they submit to official examination of all transactions when this is demanded. London Continental merchants and representatives of Continental steel works are now in session in London discussing the new situation.

British Prices f.o.b. United Kingdom Ports

Per Gross Ton

Ferromanganese, export	£9		
Billets, open-hearth	£5	to £5 7s.	6d.
Black sheets, Japanese specifications	£11		
Tin plate, per base box	17s.	3d. to 17s.	9d.
Steel bars, open-hearth	£7 17½s.	to £8 7½s.	
Beams, open-hrth.	£7 7½s.	to £7 17½s.	
Channels, open-hearth	£7 12½s.	to £8 2½s.	
Angles, open-hearth	£7 7½s.	to £7 17½s.	
Black sheets, No. 24 gage	£8 10s.		
Galvanized sheets, No. 24 gage	£10 10s.	to £10 15s.	

Continental Prices f.o.b. Continental Ports

Per Metric Ton, Gold £ at $4.86

*Billets, Thomas	£2 7s.		
Wire rods, No. 5 B.W.G.	£4 10s.		
Black sheets, No. 31 gage, Japanese	£11 5s.		
*Steel bars, merchant	£3		
Beams, Thomas	£2 16s.	6d.	
*Angles (*basis*)	£3		
Hoops and strip steel over 6-in. base	£3 12s.	6d.	
Wire, plain, No. 8	£5 7s.	6d.	
Wire nails	£5 15s.		
Wire, barbed, 4-pt. No. 10 B.W.G.	£8 15s.		

*Prices same as established by European Raw Steel Cartel.

Foundrymen to Confer On Industrial Control

Important conferences to consider this subject of greatest importance to all foundrymen have been arranged on the following days of A. F. A. Convention Week, at Hotel Stevens, Chicago:

Wednesday P. M., June 21, under auspices of the Gray Iron Institute.

Thursday P. M., June 22, under auspices of the Malleable Iron Research Institute.

Friday A. M., June 23, under auspices of the Steel Founders' Society of America.

Friday P. M., June 23, general meeting of Non-ferrous Foundry Executives.

These conferences will be open to all foundrymen, regardless of Association or Society affiliation, and it is earnestly hoped that every industrial district in the United States where castings are made will be represented at one or more of them.

SUMMARY OF THIS WEEK'S BUSINESS

Steel Demand Still Rising as Output Reaches 47 Per Cent of Capacity

Current Business Almost Entirely for Prompt Shipment as Mills Withdraw Third Quarter Quotations—Price Action Is Deferred Pending Enactment of Control Bill

DEMAND for steel continues to expand and ingot production has advanced from 44 to 47 per cent of capacity, an increase of 3 points. Output has risen from 42 to 46 per cent at Chicago and from 32 to 35 per cent at Pittsburgh, with gains also reported at Buffalo, in eastern Pennsylvania and in the South. The only setback is a temporary one in the Cleveland-Lorain district, where a decline from 65 to 63 per cent will be wiped out before the close of this week. Still further expansion of steel output is foreshadowed by blast furnace resumption. In the Youngstown area a steel company stack has been lighted and in the Pittsburgh district four Steel Corporation furnaces and one independent steel company unit will go into blast before the week end.

Steel companies are deferring action on prices for forward delivery pending final enactment of the industrial recovery bill. Producers of sheets and strip steel have withdrawn recently announced third quarter quotations, but in some cases have accepted orders for delivery until July 31, subject to price revision in case labor costs increase. Present prices on wire products have been extended by some producers through July and the larger tin plate consumers are covered for their major requirements until fall, but with these exceptions mills are accepting no business for specification after June 30.

THE effect of the pending industrial control legislation is entirely conjectural. While a general wage advance seems a certainty and at least moderate price increases are regarded as inevitable, the iron and steel industry is marking time for the present. It is possible that when new prices are named they will be limited to current orders, or to 30-day commitments at the most.

The reluctance of producers to take forward business has militated against speculative buying. It is possible, however, that some of the tonnage now being taken against second quarter contracts exceeds present needs. In this connection, it should be noted that only a moderate enlargement of consumers' stocks would add materially to the demand on the mills. Protective action of this sort, although probably not widespread, is not confined to steel users. The resumption of operations by a large pipe mill, primarily to replenish stocks, was presumably influenced by the prospect of higher costs later in the summer.

ALTHOUGH control legislation may have speeded up buying, and demand remains unbalanced, with little support coming from the railroads, construction or the oil industry, there is no gainsaying that steel consumption is still increasing. June sales of automobiles are moving contrary to the usual seasonal trend, and retail deliveries this month may set a new high mark for the year. More steel tonnage is now being placed by makers of medium and high-priced cars, and mills believe the flow of business from the automotive trade will remain at a fairly high level until at least the middle of July.

Tin plate specifications are the heaviest in more than three years and production is sustained at a 90 per cent rate. An export order for 200,000 boxes of tin plate has added to producers' large domestic backlog.

Fabricated steel awards, at 3950 tons, are among the lowest of the year, comparing with 11,800 tons a week ago. Revival of demand from both the construction industry and the railroads still awaits Governmental action.

SCRAP is steady in most districts and heavy melting grade has advanced at Detroit and Buffalo. Iron ore prices have been reestablished at the level that has prevailed since 1929. A water movement of 15,000,000 to 16,000,000 tons of ore is predicted, as compared with 3,567,985 tons handled on the Lakes in 1932. Cast iron pipe has been marked up $3 in the Chicago district, following similar advances in the East and in the South. An advance in boiler tube quotations, recently predicted, has not yet materialized.

Pig iron producers have taken third quarter contracts but are turning down fourth quarter business. Current shipments are running ahead of those of May. In some cases melters are now taking July shipments, indicating that their operations are expanding. Prices are steadily growing firmer and furnaces are showing less disposition to invade each other's territories.

THE IRON AGE composite prices are unchanged, finished steel at 1.892c. a lb., pig iron at $15.01 a gross ton and steel scrap at $9.92 a ton.

▲▲▲ A Comparison of Prices ▲▲▲

Market Prices at Date, and One Week, One Month and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron	June 13, 1933	June 6, 1933	May 16, 1933	June 14, 1932
Per Gross Ton:				
No. 2 fdy., Philadelphia	**$16.34**	**$16.34**	**$15.34**	**$14.84**
No. 2, Valley furnace	15.50	15.50	14.50	14.50
No. 2 Southern, Cin'ti	16.51	16.51	15.82	13.82
No. 2, Birmingham	12.00	12.00	12.00	11.00
No. 2 foundry, Chicago*	**16.00**	**16.00**	**16.00**	**16.00**
Basic, del'd eastern Pa.	16.09	16.09	15.09	16.00
Basic, Valley furnace	15.00	15.00	14.00	14.00
Valley Bessemer, del'd Pgh.	17.89	17.89	16.89	16.89
Malleable, Chicago*	16.00	16.00	16.00	16.00
Malleable, Valley	**15.50**	**15.50**	**14.50**	**15.00**
L. S. charcoal, Chicago	23.17	23.17	23.17	23.17
Ferromanganese, seab'd carlots	**68.00**	**68.00**	**68.00**	**68.00**

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

Rails, Billets, etc.				
Per Gross Ton:				
Rails, heavy, at mill	**$40.00**	**$40.00**	**$40.00**	**$43.00**
Light rails at mill	30.00	30.00	30.00	32.00
Rerolling billets, Pittsburgh	26.00	26.00	26.00	27.00
Sheet bars, Pittsburgh	26.00	26.00	26.00	26.00
Slabs, Pittsburgh	**26.00**	**26.00**	**26.00**	**27.00**
Forging billets, Pittsburgh	31.00	31.00	31.00	33.00
Wire rods, Pittsburgh	35.00	35.00	35.00	37.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.60	1.60	1.60	1.60

Finished Steel				
Per. Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.60	1.60	1.60	1.60
Bars, Chicago	1.70	1.70	1.70	1.70
Bars, Cleveland	1.65	1.65	1.65	1.65
Bars, New York	1.95	1.95	1.95	1.95
Tank plates, Pittsburgh	**1.50**	**1.50**	**1.50**	**1.60**
Tank plates, Chicago	1.70	1.70	1.70	1.70
Tank plates, New York	1.598	1.598	1.598	1.898
Structural shapes, Pittsburgh	1.60	1.60	1.60	1.60
Structural shapes, Chicago	1.70	1.70	1.70	1.70
Structural shapes, New York	1.86775	1.86775	1.86775	1.86775
Cold-finished bars, Pittsburgh	**1.70**	**1.70**	**1.70**	**1.70**
Hot-rolled strips, Pittsburgh	**1.55**	**1.55**	**1.45**	**1.40**
Cold-rolled strips, Pittsburgh	2.00	2.00	1.80	2.00

Finished Steel	June 13, 1933	June 6, 1933	May 16, 1933	June 14, 1932
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.10	2.10	2.00	2.20
Hot-rolled annealed sheets, No. 24, Chicago dist. mill	2.20	2.20	2.10	2.30
Sheets, galv., No. 24, P'gh.	2.70	2.70	2.70	2.85
Sheets, galv., No. 24, Chicago dist. mill	2.80	2.80	2.80	2.95
Hot-rolled sheets, No. 10, Pgh.	1.50	1.50	1.40	1.55
Hot-rolled sheets, No. 10, Chicago dist. mill	1.60	1.60	1.50	1.65
Wire nails, Pittsburgh	1.85	1.85	1.85	1.95
Wire nails, Chicago dist. mill	1.90	1.90	1.90	2.00
Plain wire, Pittsburgh	2.10	2.10	2.10	2.20
Plain wire, Chicago dist. mill	2.15	2.15	2.15	2.25
Barbed wire, galv., Pittsburgh	**2.35**	**2.35**	**2.35**	**2.60**
Barbed wire, galv., Chicago dist. mill	2.40	2.40	2.40	2.65
Tin plate, 100 lb. box, P'gh	**$4.25**	**$4.25**	**$4.25**	**$4.75**

Old Material				
Per Gross Ton:				
Heavy melting steel, P'gh.	**$11.75**	**$11.75**	**$11.75**	**$9.00**
Heavy melting steel, Phila.	**9.25**	**9.25**	**9.25**	**6.25**
Heavy melting steel, Ch'go	**8.75**	**8.75**	**8.50**	**5.75**
Carwheels, Chicago	9.50	9.50	9.50	5.50
Carwheels, Philadelphia	10.25	10.25	9.75	8.00
No. 1 cast, Pittsburgh	10.50	10.50	10.50	9.00
No. 1 cast, Philadelphia	**10.25**	**10.25**	**10.25**	**8.00**
No. 1 cast, Ch'go (net ton)	**8.75**	**8.75**	**8.75**	**6.00**
No. 1 RR. wrot., Phila.	10.75	10.75	10.75	8.50
No. 1 RR. wrot., Ch'go (net)	**6.50**	**6.50**	**6.50**	**3.75**

Coke, Connellsville				
Per Net Ton at Oven:				
Furnace coke, prompt	$1.75	$1.75	$1.75	$2.00
Foundry coke, prompt	2.50	2.50	2.50	3.00

Metals				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Electrolytic copper, refinery	7.75	7.75	6.75	5.12½
Lake copper, New York	8.00	8.00	7.00	5.50
Tin (Straits), New York	**46.00**	**42.12½**	**35.87½**	**19.00**
Zinc, East St. Louis	4.30	4.30	3.70	2.80
Zinc, New York	4.67	4.67	4.07	3.17
Lead, St. Louis	**4.05**	**3.95**	**3.52½**	**2.90**
Lead, New York	4.20	4.10	3.65	3.00
Antimony (Asiatic), N. Y.	6.50	6.35	6.25	5.12½

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

▲ ▲ ▲

▲▲▲ The Iron Age Composite Prices ▲▲▲

	Finished Steel	Pig Iron	Steel Scrap
June 13, 1933	1.892c. a Lb.	$15.01 a Gross Ton	$9.92 a Gross Ton
One week ago	1.892c.	15.01	9.92
One month ago	1.867c.	14.41	9.83
One year ago	1.970c.	14.01	7.00
	Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot rolled strip. These products make 85 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel		Pig Iron		Steel Scrap	
	High	Low	High	Low	High	Low
1933	1.948c., Jan. 3	1.867c., Apr. 18	$15.01, May 29	$13.56, Jan. 3	$9.92, June 6	$6.75, Jan. 3
1932	1.977c., Oct. 4	1.926c., Feb. 2	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.42, July 5
1931	2.037c., Jan. 13	1.945c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.273c., Jan. 7	2.018c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.317c., April 2	2.273c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.286c., Dec. 11	2.217c., July 17	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.402c., Jan. 4	2.212c., Nov. 1	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22

Steel Bookings Continue to Gain in Pittsburgh Area

Ingot Production Advances to 35 Per Cent of Capacity—Tin Plate Specifications Heaviest in Three Years

PITTSBURGH, June 13.—Backed up by increased orders for tin plate, sheets, strip steel and bars, aggregate demand for finished steel products in this district is running well ahead of the corresponding May period, and the increased requirements of finishing mills have boosted steel ingot production rather sharply.

The automotive industry still leads the major consuming groups, although tin plate specifications last week were the heaviest in more than three years, and increasing demand is coming from makers of steel barrels and drums and electric refrigerators and from jobbers. The inability of consumers to get coverage beyond June 30 is preventing speculative buying, although many buyers of steel are now taking out more material against old contracts than they are actually using. The Norfolk & Western will close this week on 10,000 tons of rails, but further activity on the part of the carriers is being deferred until after the recently passed railroad rehabilitation plan becomes operative. The construction industry continues quiet, with interest centered on prospective tonnage offered by the federal public works program.

Delay in final passage of industrial recovery legislation still prevents steel companies from announcing third quarter quotations on major products. A general wage advance now seems to be certain, although increases in finished steel prices will likely be moderate in the near future. Nevertheless the effect of pending legislation is entirely conjectural, and the steel industry is generally awaiting more definite information.

Steel ingot production in the Pittsburgh district has risen rather sharply this week and averages at least 35 per cent of capacity. Four Steel Corporation stacks and one independent blast furnace will go in before the end of the week, and a large pipe mill which has been inactive for several months is resuming production. In the Youngstown district steel production still averages about 50 per cent of capacity, and another steel works blast furnace has been blown in. Output in the Wheeling district is holding at 85 per cent. Tin plate production has risen to 90 per cent of capacity, with sufficient backlog tonnage on company books to maintain this rate for at least a month. Sheet schedules are over 40 per cent, and strip and bar production has been stepped up. Output of pipe is heavier, although production is going into stock in many instances. The local rail mill is producing sheet bars for tin plate production.

Pig Iron

The placing with a Valley producer of 1200 tons of Bessemer iron at the full quoted price of $16, Valley furnace, has done much to establish iron prices in this district. The buyer was the Mesta Machine Co., West Homestead, Pa., and the seller a steel company in Youngstown. Other sales at the recently advanced prices have generally been small, but the market is now regarded as quite firm. Malleable and foundry iron are quoted at $15.50, Valley furnace, and basic at $15, with the local producer quoting prices 50c. a ton higher.

Semi-Finished Steel

Shipments against old contracts are improved, but no third quarter coverage has been reported. One or two buyers of billets, slabs and sheet bars have tried to increase their current contracts for shipment before July 15, but mills are reluctant to cover them in this way. Forging billets are still quotable at $31, Pittsburgh, but no price has been announced for third quarter. Wire rods are moving in better volume, with shipments at the present price of $35, Pittsburgh or Cleveland, expected to be completed within a month. No forward quotation has been named.

Rails and Track Accessories

This market has been quiet in the last week, although the Norfolk & Western is momentarily expected to close against its inquiry for 10,000 tons of rails. The rails for the Seaboard Air Line will probably go to the Southern producer. Several carriers have issued their usual inquiries for third quarter steel requirements, but steel companies are unwilling to quote for that period. Passage by Congress of the Railroad Rehabilitation Bill is expected to bring some action from the carriers in the near future.

Bars, Plates and Shapes

The structural steel market is still comparatively quiet, although demand for bars and plates seems to be expanding. Shipments of reinforcing bars are also going forward in better volume, with new inquiry considerably improved. Merchant steel bar demand is well diversified, although the automotive industry is still the principal taker. Cold-finishing mills are increasing their requirements,while producers of alloy steel bars report a well sustained demand. Both structural steel and reinforcing bar makers are watching developments in Washington very closely, with the prospect of large tonnages to be required for the public works program now being completed. It is hoped that many of these projects will reach a bidding stage in the early fall, because not much tonnage from other sources is in sight. No railroad car buying has developed in this district, and demand for tankage steel from the oil industry continues quiet. River barge inquiry is fairly heavy, but not of a definite character.

Third quarter prices on bars, plates and shapes are still withheld, and steel producers seem determined to make no forward commitments until the effects of the Industrial Recovery Bill can be fully ascertained. The spot market on bars and shapes is holding at 1.60c., Pittsburgh, with plates still quotable at a $2 range.

Bolts, Nuts and Rivets

Orders are improving with all producers, but third quarter books have not yet been opened. Production in the industry as a whole has risen to about 35 per cent of capacity, with current releases indicating an even higher rate before the end of the month.

Cold-Finished Steel Bars

Tonnage has improved in the last week, and some consumers are believed to be issuing larger specifications than their immediate needs call for. Old contracts will be generally worked out before the end of the month, but July shipments will probably benefit materially. The base price is well maintained at 1.70c., Pittsburgh.

Wire Products

Specifications have expanded rather sharply since the first of the month, particularly on merchant wire products. Jobbers seem more disposed to build up their stocks, and are also anxious to take out tonnage on old contracts in anticipation of a price advance. Manufacturers' wire is moving in good volume to some consumers, although demand is rather spotty. Current prices are well maintained, but apply only to material specified prior to June 30.

Tubular Goods

Pipe shipments this month are running slightly ahead of the corresponding May period, although consignment tonnage is forming an important part of the movement. Demand has failed to pick up in any particular departments of the industry, although mechanical tubing and boiler tubes are possibly most active. A large pipe making unit in the Pitts-

burgh district, which has been inactive for several months is resuming production this week, and will raise the industry's operating rate considerably. Much of the output will be devoted to the building up of depleted stocks, as general demand for tubular products has not improved sufficiently to warrant such expansion in operations. The advance in boiler tube quotations, which was predicted last week, has not yet materialized.

Sheets

With further heavy releases from the automotive industry, as well as from barrel and drum manufacturers, sheet tonnage this month is considerably ahead of the corresponding May period. Diversified demand is also reported from other sources, and the desire on the part of consumers to take all the tonnage now contracted for is increasing. Several makers have not yet opened their books for third quarter, and prices may be named which are higher than those announced recently by some of the leading independents. Current shipments are at a much lower price level.

Tin Plate

Last week brought the heaviest specifications in more than three years to tin plate makers in this district, and production has been boosted over the 90 per cent level. Some mills have sufficient backlogs for at least a full month's capacity output. Most of this tonnage represents releases against contracts which would not be affected by a price advance. Nevertheless, smaller buyers are beginning to come into the market in anticipation of a higher price for the second half. A 200,000-box export order was divided between two large makers last week, the price being 25c. a box higher than was realized on the most recent export business placed.

Strip Steel

With automotive orders undiminished and demand from other sources continuing to expand, the strip industry has advanced production to 40 per cent of capacity, with an even higher level in prospect before the end of the month. Several large buyers have placed third quarter contracts for hot-rolled strip at 1.60c., Pittsburgh, and the 2c. price on cold-rolled for the same period has been established by a number of sales. Tonnage against old contracts is still moving at lower prices, but new orders can no longer be booked at such levels.

Coal and Coke

The market on both coal and coke is increasingly active, as plans for the industry's stabilization go forward. Some of the largest producers are making amicable wage arrangements with their employees, and further advances have been made in the last week. A merchant pig iron interest in eastern Pennsylvania has been sounding out the market for furnace coke in this district. Shipments will soon get under way to the Chateaugay stack in New York State. Foundry coke is also more active, and some consumers are attempting to place contracts for the remainder of the year. Producers are generally reluctant to cover them. Coke and coal prices show no appreciable strength.

Scrap

Scrap prices have shown no further weakness in the last week, and the market has a stronger tone on some grades. Heavy melting steel has been sold at $12, although some mills who are tentatively in the market are unwilling to pay this price. Hydraulic compressed sheets have been sold at the same level as steel and are more difficult to obtain. A sale of No. 2 steel at $10.75 has advanced the market slightly. Machine shop turnings are lower on the basis of a sale into consumption at $8.75. Some dealers are offering only $8.25, but turnings are scarce at this figure. The foundry grades are strong, although buying does not involve large tonnages.

Lighter Steel Products Active at St. Louis

ST. LOUIS, June 13.—Sales of pig iron during the last week were exceedingly light, being confined to small lots for spot delivery. Steel mills especially are withholding commitments for basic iron except for immediate requirements. Prices are unchanged and firm.

In the steel trade, demand for lighter products, such as galvanized sheets and wired products, continues to hold the spotlight. Mills are not making any commitments into the next quarter because of the uncertainty of prices. Similarly, structural fabricators are hesitant about making contracts. Railroad buying is confined to structural steel for bridge repairs.

Scrap sales are lacking, but it is understood that several definite inquiries for round tonnages are pending. Prices were unchanged but firm. The Louisville & Nashville has a list of 36,000 tons, but with higher prices being paid in Eastern and Southern markets, it is expected that little or none will come here. The Missouri Pacific sold 100 carloads.

Prices Stronger on Pacific Coast

SAN FRANCISCO, June 12.—Although building construction continues to lag, prices are firmer because of the belief that there will be advances on all steel products starting with the third quarter. The mills are not quoting any prices beyond the first of the month. Common wire nails have gone up 15c. a keg during the week. It is reported that the jobbers' sales of steel showed a 25 to 30 per cent increase during May.

At Seattle no regular bids were received on the Diablo power house, and the closing date on the Railway Avenue seawall has been advanced to June 22. Work is being speeded on the San Francisco-Oakland bridge and considerable steel tonnage should be placed during the coming week. To date no award has been made at Los Angeles on the Bouquet Canyon dam conduit pipes, requiring 4125 tons of plates. The date for bids for the 271-mile transmission line from Boulder Dam to Los Angeles, requiring 28,000 tons of shapes in the towers, is expected to be set before the end of the month. The General Cable Corpn. has just taken 8000 tons of copper cable for this project.

Boston Pig Iron Sales Decline

BOSTON, June 13.—Pig iron sales the past week were somewhat smaller, amounting to about 1000 tons, the smallest noted in several weeks. The Mystic Iron Works disposed of 650 tons. All sales were for third quarter delivery, as most furnaces still are withholding fourth quarter quotations. There are no inquiries of importance in the open market. The New England melt has been stepped up a little more and is now around 25 per cent of rated capacity.

There is some old material moving each day, but it is very largely confined to No. 1 heavy melting steel, steel turnings and engine blocks, and in the aggregate is not very important. Prices are holding firm. Due to an unprecedented demand for used textile machinery, the current available supply of textile cast is considerably reduced. There is, however, an abundance of No. 1 machinery cast, and foundries in a number of instances are substituting this for textile cast. The price of textile cast is no higher despite the supply situation.

Simplified practice recommendation R45-32 (fourth edition) covering grinding wheels, is now in print. It includes standard nomenclature for various classes of work in the grinding industry. Copies can be obtained from the Government Printing Office, Washington, for 5c. each.

Chicago Steel Output Rises to 46 Per Cent of Capacity

Flow of New Business Unchecked, But Sellers Generally Refrain From Committing Themselves for Third Quarter

CHICAGO, June 13.—The recent tendency of the ingot production curve to flatten out has passed and output has risen sharply to 46 per cent of capacity, a gain of at least four points in about as many days.

New sales and specifications for steel are as good as at any time this year, and there is ample evidence that demand is growing. There is a possibility that farm implement manufacturers will swing into heavier production early in July and that tonnage will be placed by the oil industry soon after the industrial control bill is enacted.

Prices for steel are strong and unchanged, and undoubtedly will remain so until the industry knows where it stands under the industrial recovery act. Recent quotations on sheets for third quarter have been revised to cover only a 30-day period and orders taken now include a wage clause under which increased labor cost will be passed on to buyers. Pig iron can be bought at current levels for the third quarter, but purchases of practically all steel products are limited to June specification for delivery not beyond the end of July.

New sales of scrap have strongly established the market at present levels and all signs of weakness in the price structure have disappeared. In fact, the close balance between demand and consumption leads many to believe that prices will move up in the near future.

Pig Iron

Although new buying of Northern foundry iron is below the May rate, nevertheless there is rather a uniform flow of new business, much of it in the form of repeat orders resulting from anticipation of July shipments. Some foundries are being urged by buyers to cover on iron for their castings needs for the remainder of the year, and in this way melters are assured financial backing. Prices are steady and it is not improbable that silicon differentials will be firmly reestablished on the basis of 25c. for 25 points.

Cast Iron Pipe

Prices are being marked up $3 a ton, quotations now being $35 a ton, Birmingham, for lots of 200 tons or more and $36 a ton for less than 200 tons of 6-in. and larger diameter pipe. The freight rate to Chicago is $8.40 a ton. The market remains very dull. Many municipalities have plans, but they evidently will not take action until they determine what assistance can be had from Washington. The utilities are inactive.

Reinforcing Bars

Any marked gain in activity is dependent on three factors: the Federal public works program, Federal aid for road construction and untangling of the cement price controversy in Illinois. Fresh inquiry is almost wholly limited to very small tonnages, but the number of these is greater than a few weeks ago. Some scattered slab, bridge and culvert work is up for figures from a number of counties in Illinois. Current brewery work is limited to maintenance of existing plants.

Bolts, Nuts and Rivets

Current quotations subject to change July 1 are holding. There has come rather suddenly a sharp upward swing in demand for bolts and nuts, but rivets of all sizes remain inactive. It is now reported that some farm implement manufacturers may start production programs soon after July 1.

Rails and Track Supplies

This market is without feature. Mills are without new orders and no rail programs, big or little, are being planned by Western railroads. Track accessory wants are light, though heavier than earlier in the spring. Demand for light rails is at a standstill.

Structural Material

Structural awards, at 700 tons, are unusually light, and fresh inquiries, except for 1500 tons for beam spans for the Missouri Pacific, offer little encouragement for the near future. Most current lettings consist of small railroad bridges, highway bridgework being very light. Award of the tonnage for an industrial building at Chicago practically wipes the list clean of private projects.

Plates

Aside from brewery work the plate market does not show much activity aside from the fact that a number of projects requiring plate tonnages are in the making. The Standard Oil Co. and the Pure Oil Co. have plans prepared for refineries at Port Arthur, Tex. The total steel involved being about 6000 tons. It is understood here that these projects are being held back pending the outcome of legislation at Washington. Some oil country tonnage is also pending for shipment out of continental United States. Prices for plates remain firm at 1.70c. a lb., Chicago, for specifications that must be issued in June.

Wire Products

Demand from the manufacturing trade continues to climb and output is firmly established at 50 per cent of capacity. Business, in farm areas, as is to be expected at this time of year, is rather spotty, while merchant trade as a whole is gaining. Mills are having some trouble in meeting deliveries and they are trying to urge users to order in larger lots. Current prices are firm and are in effect for the next 30 days.

Sheets

Prices recently announced by some producers for third quarter are withdrawn except for such parts of tonnages as can be delivered in July. All new business is being taken with the understanding that advances in labor wages, as contemplated by the Industrial Control Act, will be passed on to the consumer. Buyers are now accepting this labor clause in all contracts which are being written for June. Specifications and deliveries not extending beyond the end of July.

Bars

Slightly heavier consumption by automobile manufacturers is noted as builders of medium and large-size cars swing into larger production schedules. Shops making medium and heavy forgings report that business is still light. Farm implement builders continue to take larger quantities of steel but real production programs are not contemplated before the early part of July. Prices for mild steel bars are firm at 1.70c. a lb., Chicago, and all orders are subject to specifications being entered prior to July 1.

Scrap

Upward of 20,000 tons of heavy melting steel has been taken by consumers at prices ranging from $8.75 to $9 a gross ton. Dealers believe that with the present fine balance between supply and demand prices are destined to rise to higher levels. Industrial producers are offering more scrap and railroads are less inclined to argue about prices. The Milwaukee road has disposed of a tonnage and it is expected that the Santa Fe will soon dispose of a large accumulation. Slowness of shipments of busheling to a local dock is delaying a boat shipment to Lake Erie.

Federal Metal Products Corpn. has moved its main office and factory from Hoboken, N. J., to 567 Ninth Street, West New York, N. Y.

Mills Refuse Forward Business in Philadelphia District

Most Producers Limit Bookings to Current Quarter—One Accepts Third Quarter Contracts Subject to Change

PHILADELPHIA, June 13.—Improvement continues in orders for both pig iron and steel. While makers report that the gain in business has been only moderate, others have experienced a rather sharp upturn, notably in pig iron and sheets. Plate demand also has shown a considerable betterment. Railroad buying remains at a low point. Jobbers have booked more business in diversified lines.

Pending enactment of the Industrial Recovery bill, steel makers in this district are not quoting beyond the second quarter. An outside mill, however, is quoting on sheets for the third quarter at recently increased levels, but is offering contracts subject to changes in wages, prices of raw materials, freight rates and new prices that may result from federal legislation.

Open-hearth operations have increased one point to 23 per cent of capacity. A nearby plant yesterday started a small structural mill and tomorrow will add a large structural mill to its operations.

Pig Iron

Most sellers report a moderate increase in shipments of foundry iron, indicating a growth of melt. One blast furnace interest reports that deliveries so far this month are being made at a rate of two and one-half times the May rate. Prices are firm. Receipts of Indian iron at this port in May totaled 4052 tons and since the first of the year Indian iron imported into Philadelphia has aggregated 20,242 tons. There has been a sharp falling off of imports of Royal Dutch iron. Foreign iron prices now are said to be near to those for domestic grades.

Plates, Shapes and Bars

Fair improvement in demand for plates has developed and comes chiefly from oil and brewery interests. There also has been a moderate gain in orders for merchant steel bars, while lack of new construction has left the demand for shapes unchanged. Bids will be opened on July 6 by the Navy Department for four destroyers, requiring 2000 tons of plates. Sinclair & Briggs, Philadelphia, were awarded the general contract for construction of Pier No. 1 at Baltimore for the Pennsylvania Railroad, calling for about 4000 tons of shapes and approximately 1400 tons of plates. One nearby mill was awarded about 235 tons of plates and another mill in this district was awarded 75 tons of shapes for a steel barge to be built by John H. Mathis & Co. in their shipyard at Camden, N. J.

Sheets

Sheet demand is holding up well and some mills report a substantial improvement. Most of the requirements come from the automotive industry, though electric refrigerator and radio makers continue to take fair-sized tonnages. Jobbers also are buying more freely. The prospect of higher levels for the third quarter has stimulated purchases, but the bulk of shipments is going into immediate consumption.

Warehouse Business

Heavier and more diversified demand is coming to jobbers. Deliveries also have shown a substantial pick-up.

Imports

The following iron and steel imports were received here last week: 5000 tons of manganese ore from Gold Coast, 3681 tons of pig iron from the Netherlands and 1057 tons of the same product from British India, 409 tons of iron ore from Spain, and 53 tons of sponge iron, 16 tons of steel bars, 12 tons of steel tubes and 1 ton of band steel from Sweden.

Scrap

The market is quiet but has a firm undertone. A dealer has purchased blast furnace turnings at a price equivalent to $4.50, delivered furnace. This is the first transaction of the kind in six months in this district.

Blast Furnace to Go in This Week at Buffalo

BUFFALO, June 13.—Pig iron business placed last week is believed to have totaled about 5000 or 6000 tons. Orders ranged from small lots to 200 tons, 500 tons and 1000 tons, with considerable iron placed without the formality of an inquiry. Prices are unchanged. The Tonawanda Iron Corpn. furnace will be blown in this week. Republic Steel Corpn. is preparing a furnace in the event it is needed, and Hanna Furnace Corpn. is relining a furnace.

Steel

Bethlehem's Lackawanna plant has increased the number of its active open-hearths from seven to eight; Republic Steel Corpn. continues at four open-hearths, including its 200-ton furnace, and Seneca Sheet division of Bethlehem is now running at a 45 per cent rate. Wickwire-Spencer Corpn. continues to operate one open-hearth. A local fabricator obtained the contract for 100 tons of structural steel for an addition to the Iroquois Beverage Co. brewery, and 100 tons for an addition to the Oldbury Electro-Chemical Co. at Niagara Falls, N. Y.

Scrap

Approximately 7500 tons of No. 1 heavy melting steel and No. 2 heavy melting steel was sold during the past week to two mills at $9.50 for the No. 1 and $8.50 for the No. 2. With increased blast furnace operations in prospect, pig iron interests have come into the market and a considerable tonnage of mixed borings and turnings and cast iron borings has been sold at $6 to $6.50. The market appears to be strengthening.

Steel Output Gains in South

BIRMINGHAM, June 13.—June pig iron shipments have not only maintained the improved rate of May but are slightly ahead of the same period last month. Current bookings are not so large, as most foundries are already covered through June. Current business is coming from those foundries that continue to buy only iron as it is needed and from those that underestimated their needs for the quarter. From week to week there is also an increase in forward tonnage for the third quarter. The market is firm at $12. There is some talk of a possible increase, but nothing definite is available.

Pipe output has not improved and is far from its accustomed summer rate. Tonnage is still confined mostly to small lots.

No change in the number of active blast furnaces has taken place this month. Four are operating, two on basic and two on foundry. Last week Republic Steel Corpn. changed its furnace from foundry iron to basic and will produce this grade for about five weeks.

Scrap demand is holding to the stronger trend of the past several weeks.

Steel

Steel demand is showing no signs of recession. Last week's tonnage was one of the best in the past two months. Bale tie business has taken a jump upward, with the season now in full swing. Wire products and sheets have also contributed their full share to mill bookings. Open-hearth operations ranged from 11 to 12 units last week, a gain of one over the preceding week. This week it is likely that 12 will also be operated for most of the

time. Books have not yet been opened for third quarter tonnage, but this business will likely start during this week, as new July prices will be announced within the next day or so. Price increases have been indicated, but cannot be confirmed at this time. Several railroad orders are pending and it is likely that the Ensley rail mill of the Tennessee Coal, Iron & Railroad Co., which operated the week of May 29, may resume work for another week before the end of June.

Iron and Steel Demand Sustained at Cincinnati

CINCINNATI, June 13. — Steadiness of business activity in the district market has stimulated buying. As a result, pig iron bookings, the past week, exceeded the 1000-ton level for the second consecutive week. Consumers who contracted for substantial tonnages just prior to the recent price advances entered the market again, in anticipation of their future requirements. An east central Ohio buyer took 500 tons of Northern foundry iron, and two Indiana consumers purchased 300 tons and 200 tons respectively. Foundry operations are improving moderately in all lines except machine tools.

Steel

Well sustained demand for finished sheets is keeping mill operations at the level that has prevailed for the past several weeks. Automotive specifications are good, while the general demand, except for road construction work and railroad use, is improving moderately. Current bookings are for immediate use and speculative buying is absent. Prices remain firm.

Scrap

Activity is confined almost entirely to small, quiet buying. Mills are taking some scrap on old contracts, but lack of an ample supply of material in the market is curtailing purchases. Most dealers are holding yard stocks for better prices. The general market tone is strong, presaging an early advance in quotations.

Further Advances in Scrap at Detroit

DETROIT, June 13.—Influenced by the demand in other districts rather than by the local situation, heavy melting steel has advanced 25c. a ton, with dealers paying $7.50 to $8. Sheet clips and flashings also are up 50c. and 25c. a ton respectively. Other items are firm but unchanged. Steel mills are taking in moderate tonnages on current contracts but are deferring fresh purchases until the future trend of operations is clarified. The Buick Motor Co. has bought 7900 tons of scrap steel rails direct from the Pere Marquette Railroad.

Steel Bookings Continue to Expand in New York Area

Further Rise in Specifications Expected as End of Month Draws Near—Believe Summer Lull May Be Avoided

NEW YORK, June 13.—Demand for finished steel continues to expand. Specifications last week were exceptional for some sellers, in a few cases being equal to from one-half to three-quarters of total bookings for the month of May. Impressed by the contra-seasonal behavior of the market, the trade now sees a strong possibility of getting through the summer without the usual mid-year slump. Nevertheless it is to be noted that demand is still poorly balanced. Activity is still confined mainly to tin plate, sheets, wire products and other light lines. Construction work is lacking and railroad buying remains at a low ebb. Tank builders are getting most of their current business from the breweries. A current inquiry from a fabricator calls for 240 tons of bars for wooden tanks. Most pipe line projects are held up awaiting financial arrangements. However, an inquiry for a gas pipe line in New York State for the Lycoming Gas Co. has been revived. It will call for 2500 tons instead of 1200 tons, as originally planned.

Most buyers are covered by contract for the second quarter and are specifying liberally. Although there are few indications of speculative buying, the remainder of this month is expected to bring out a further sharp increase in orders. Except in tin plate and wire products, few sellers have accepted business for specification after June 30. Tin plate contracts, of course, have been taken for the entire canning season, while specifications for wire products will be taken until July 31. Despite the reluctance of mills to commit themselves through third quarter, some of them have been lenient with customers wishing to increase their orders at second quarter contract prices.

Pig Iron

Activity continues to be light. Bookings in the past week, at 3500 tons, approximated those in the preceding week and compare with 6000 tons two weeks ago. Open inquiry is meager. Quotations are being asked for 500 tons for third quarter delivery outside this district. Other pending business is comprised of small lots aggregating about 1000 tons. A further slight improvement in foundry melt is indicated by more frequent releases against contracts. Domestic prices are firm and unchanged. Foreign quotations also reflect stronger tendencies.

Reinforcing Bars

Specifications are improved. A sewage disposal p'ant at Woodbridge, N. J., will require 524 tons of bars. Bar requirements are being figured on bridge and highway projects at Jones Beach, N. Y., and for buildings at Wassaic State School, Wassaic, N. Y. About 1000 tons of reinforcing trusses and mesh for the Rip Van Winkle Bridge, Catskill, N. Y., will probably be purchased late this week by Frederick Snare Corpn., New York, general contractor. Prices are firm and unchanged.

Scrap

Prices continue firm. Brokers continue to restrict offerings of the heavy melting grades at present levels, in view of the stronger tone in other districts. There is little new buying, though consumer interest is sustained. Acceptances against existing orders are considered satisfactory and reflect the recent improvement in mill operations in the East. Specification pipe, based on a recent sale for delivery at Lebanon, Pa., has advanced moderately to a basis of $3.50 a ton. Heavy melting steel and specialties are unchanged.

Canadian Mill Books Large Rail Order

TORONTO, ONT., June 13.—The Dominion Steel & Coal Co., Sydney, N. S., has closed a contract for 50,000 tons of steel rails from the Dominion Government for the Canadian National Railways. This order will mean that the company will start up its rail mill, a battery of open-hearth furnaces and blow in one or two blast furnaces. The Canadian Car & Foundry Co., Montreal, Que., will start up its rolling mill at Amherst, N. S. The Canadian Furnace Co., Port Colborne, Ont., will blow in its blast furnace within the next week or two to replenish its pig iron supply. It is understood that both the Steel Co. of Canada and the Algoma Steel Corpn. will soon blow in furnaces. Pig iron prices remain firm but unchanged.

Scrap has not shown as much improvement as other branches of the iron and steel trades. Sales of steel scrap for export are being made, but there is little or no domestic demand for heavy melting steel or turnings. Scrap prices are firm at recently revised levels.

No Signs of Slackening of Demand at Cleveland

Mills Avoid Third Quarter Commitments, Though in Some Cases Accepting Forward Business Subject to Price Changes

CLEVELAND, June 13.—With a continuation of a steady flow of orders, demand for finished steel shows no signs of slackening. While steel ingot production in Cleveland is unchanged at 53 per cent of capacity, there was a two-point decline in ingot output in this territory this week to 63 per cent due to the shutting down of an open-hearth furnace in Lorain for repairs. However, this loss will be offset by the starting up of another unit later in the week by the Corrigan, McKinney Steel Co., which will then have 12 out of 14 open-hearths in operation.

The steel industry is still withholding action on prices for delivery after July 1, pending the enactment of industrial control legislation and the determination as to what effect the federal regulations will have on production costs. Present prices on wire products and wire rods have been extended by some makers through July, but with this exception no additional price announcements have been made for the coming quarter and, when new prices are named, they probably will be only for current orders or for 30 days. In the meantime inquiries for the third quarter have become more numerous.

Those makers who previously announced third quarter prices on sheets and strip steel have either withdrawn those prices or are delaying in making future commitments. Some large sheet consumers, in order to assure uninterrupted deliveries, have placed orders for material for deliveries after July 15 subject to the prices then prevailing. While certain consumers evidently have placed orders for June shipment in excess of their expected requirements because of expected price advances, the amount of speculative buying evidently has not been heavy.

Pig Iron

Sales are holding up fairly well, although they are not as heavy as before the recent price advance. One producer sold 4000 tons during the week, including one 1000-ton lot to an Ohio foundry. Considerable inquiry has come out for fourth quarter contracts, but furnaces will not sell for delivery beyond the third quarter. Shipments continue larger than in May. Prices are firm. Keen competition that resulted in price concessions for delivery to competitive points seems to have largely disappeared, furnaces not showing their recent disposition to invade each other's territories with cut prices.

Iron Ore

Last year's ore prices have been reestablished for 1933 by the closing of several contracts, involving substantial tonnages, by the ore companies with affiliated consuming interests. This will be the fifth year in which the same prices have prevailed, the present schedule having been adopted in 1929. No change had been expected this year. Some of the tonnage was placed by consumers who took no ore last year. Many consuming interests having long-term contracts will make formal commitments at the reaffirmed prices. With the recent improvement in the steel industry and a reduction of over 4,500,000 tons in stocks at furnace yards and docks during the year the outlook in the ore industry is much brighter than a few weeks ago. A water movement of 15,000,000 to 16,000,000 tons is predicted as compared with 3,567,985 tons last year. The reaffirmed prices are: Old Range Bessemer, $4.80 per ton; Mesabi Bessemer, $4.65 per ton; Old Range non-Bessemer, $4.65 per ton; Mesabi non-Bessemer, $4.50 per ton, and high phosphorus, $4.40 per gross ton, delivered lower lake ports. Vessel carrying rates that prevailed last year have been reaffirmed. These are 70c. per gross ton from the head of Lake Superior to Lake Erie and Lake Michigan ports, 63c. from Marquette to Lake Erie ports, 52½c. from Escanaba to Lake Erie ports and 42c. from Escanaba to Lake Michigan ports. Ore on docks at Lake Erie ports, June 1, amounted to 4,906,953 tons, as against 5,533,246 tons on the same date a year ago.

Sheets

Demand from the automotive and electric refrigerator industries is holding to recent volume, and miscellaneous orders continue good. Some of the mills will make shipments against second quarter contracts up to July 15. Some consumers, being unable to secure third quarter contracts, have placed orders for deliveries after July 15 subject to prices that are to prevail at that time. By adopting this plan they are assured early deliveries after that date.

Strip Steel

Additional releases have come from some of the General Motors units that have speeded up production and mills are being crowded for deliveries of this material. Miscellaneous orders are holding up well. Demand from implement manufacturers and makers of bed springs has improved. Hot-rolled strip is 1.55c., Pittsburgh, and cold-rolled material, 1.80c. to 2c., Cleveland, for current orders.

Reinforcing Bars

Local distributers have adopted quantity differentials on billet steel bars, in cut lengths for Cleveland delivery, under which small lots are advanced. The new scale of prices, including 10c. per 100 lb. for delivery, are car lots, 1.85c. a lb.; 10 to 20 tons, 2c. a lb.; 5 to 10 tons, 2.20c.; less than 5 tons, 2.45c.

Bars, Plates and Shapes

Bars continue in good demand with orders well diversified. A local finishing mill is operating at 50 per cent of capacity. This mill will accept orders through June 30 at present prices, but will not defer shipments after July 1 longer than the time required in producing the steel. Plates are fairly active, considerable business coming from tank builders. Quick deliveries usually are called for. The Chesapeake & Ohio Railroad has taken bids for a bridge in Cincinnati requiring 600 tons of structural steel. New fabricating orders are confined to small lots.

Scrap

A local mill has placed a small tonnage of steel-making scrap based on current market quotations, which will allow dealers to cover against these orders at $9.50 for No. 1 and $9 for No. 2 heavy melting steel. This indicates that dealers have been unsuccessful in efforts to get better prices than have been prevailing. No other new demand is reported. The market is firm at recent prices. There is some activity among dealers in blast furnace scrap at quoted prices. Some No. 1 heavy melting steel has brought $12 from dealers in the Youngstown district. The Pere Marquette Railroad has sold 7800 tons of old rails to Buick Motor Car Co.

Cast Iron Pipe

Fargo, N. D., asks bids until June 26 for cast iron pipe and fittings for high lift service, connecting with municipal waterworks pumping station.

Iowa Park, Tex., plans pipe lines for municipal water supply, including new waterworks station. Cost about $36,000. Floyd & Lockridge, Tower Petroleum Building, Dallas, Tex., are engineers.

Hot Springs, Mont., plans pipe line for water supply in connection with new municipal water plant. Fund of $27,000 has been secured.

Waldron, Ark., has plans for cast iron pipe line for water service, including new waterworks station. Cost about $70,000. Dickinson & White, Rector Building, Little Rock, Ark., are engineers.

San Francisco has awarded 394 tons of 12 and 16-in. to Central Foundry Co.

Sonoma, Cal., rejected bids on 300 tons of 2 to 8-in. and will open new bids June 28.

Seattle, Queen City Construction Co. is low bidder on 1350 tons of 20-in. for Alki water improvement, with wood alternative.

Fabricated Structural Steel

Lettings in Small Volume—New Projects Again Decline

AWARDS of 3950 tons are among the lowest of the year and consist of miscellaneous work in small tonnages. New projects of 3055 tons compare with 5950 tons in the previous week and 20,350 tons two weeks ago. No new inquiry of size is reported. Awards for the week follow:

NORTH ATLANTIC STATES

Providence, R. I., 200 tons, Providence Journal Co. building, to Harris Structural Steel Co.

Poughkeepsie, N. Y., 135 tons, high school, to Belmont Iron Works.

Buffalo, 100 tons, addition to Iroquois Beverage Co., to McClintic-Marshall Corpn.

Niagara Falls, N. Y., 100 tons, addition to Oldbury Electro-Chemical Co., to McClintic-Marshall Corpn.

Newark, N. J., 250 tons, transmission towers for Public Service Corpn. of New Jersey, to McClintic-Marshall Corpn.

Passaic, N. J., 210 tons, die house alterations for Julius Forstmann Co., to McClintic-Marshall Corpn.

Cornwells Heights, Pa., 100 tons, addition to convent, to McClintic-Marshall Corpn.

Philadelphia, 200 tons, Hess-Bright Mfg. Co., to Lehigh Structural Steel Co.

Cumberland, Md., 275 tons, addition to plant of Celanese Corpn., to Belmont Iron Works.

Baltimore, 200 tons, brew house for National Brewing Co., to Dietrich Brothers.

THE SOUTH

Valverde, Tex., 820 tons, Devils River bridge, to Virginia Bridge & Iron Co.

Pampas, Tex., 125 tons, postoffice, to Houston Structural Steel Co., Houston, Tex.

CENTRAL STATES

Dearborn, Mich., 153 tons, Michigan Avenue bridge over River Rouge, to Lackawanna Steel Construction Co.

Sangamon County, Ill., 159 tons, bridge, to Pittsburgh-Des Moines Steel Co.

Chicago, 250 tons, Chicago Carton Co., to Butler Street Foundry & Iron Co., Chicago.

Laclede County, Mo., 125 tons, bridge, to Stupp Brothers Bridge & Iron Co.

Wabash Railroad, 120 tons, bridge in Missouri, to Missouri Valley Structural Steel Co.

WESTERN STATES

Southern Pacific Railroad, 150 tons, bridge, to Moore Dry Dock Co.

San Joaquin, Cal., 260 tons, subway for Southern Pacific Railroad, to McClintic-Marshall Corpn.

Los Angeles, 8000 tons of copper cable, transmission line from Boulder Dam to Los Angeles, to General Cable Corpn.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Dover-Newington, N. H., 300 tons, Little Bay bridge.

State of Pennsylvania, 580 tons, highway bridge in Ippersoe Township.

Turtle Creek, Pa., 200 tons, elementary school.

Trenton, N. J., 150 tons, office building; bids in.

Baltimore, 4000 tons, Pier No. 1 for Pennsylvania Railroad; Sinclair & Briggs, Philadelphia, general contractor.

CENTRAL STATES

Detroit, 325 tons, grade separation work.

Chicago, North Shore & Milwaukee Railroad, 540 tons, bridge.

Marion, Ind., 300 tons, boiler house.

WESTERN STATES

Seattle, 660 tons, Diablo power house.

FABRICATED PLATE

AWARDS

Edgewater, N. J., 315 tons, three tanks for Lever Brothers Co., to Chicago Bridge & Iron Works.

New Orleans, 1300 tons, 10 tanks for Dunbar Molasses Co., to Chicago Bridge & Iron Works.

New Orleans. 1500 tons, six barges for River Terminals Corpn., to American Bridge Co.

NEW PROJECTS

Baltimore, 1400 tons, Pier No. 1 for Pennsylvania Railroad; Sinclair & Briggs, Philadelphia, general contractor.

San Francisco, 100 tons, pipe over Alameda Creek, alternate on concrete, bids soon.

Pipe Lines

Sylvania Corpn., Oil City, Pa., operating natural gas properties in Hebron field, Potter County, Pa., has authorized 8 in. welded steel pipe line from that point to Roulette, Pa., and vicinity, about nine miles.

Purchasing Officer, Department of Interior, United States Indian Warehouse, 1749 West Pershing Road, Chicago, asks bids until June 20 for welded steel pipe as required during next fiscal year (Schedule 17).

Public Utilities Commission, San Francisco, will take bids at once for about 3600 ft. of steel pipe for line from point near Sunol, across Alameda Creek, to tunnel near Tracy (alternate bids will be asked for concrete pipe with steel cylinder enclosed). Cost about $125,000. L. W. Stocker, 425 Mason Street, San Francisco, is engineer.

Shell Petroleum Corpn., Shell Building, St. Louis, is considering 6-in. steel pipe line from main Oklahoma trunk line to oil area near Berry, Noble County, Okla., about 25 miles.

Kingston Gas Co., Kingston, Okla., plans steel pipe line for local natural gas distributing system. Cost about $25,000.

Reinforcing Steel

Awards 1525 Tons—New Projects, 1400 Tons

State of Pennsylvania, 225 tons, State highway in Dauphin and Berks counties, to Kalman Steel Corpn.

Chicago, 900 tons, Chicago Carton Co., to Calumet Steel Co.

San Francisco, 300 tons, Bohemian Club, to Gunn Carl & Co.

NEW REINFORCING BAR PROJECTS

Dover-Newington, N. H., 150 tons, Little Bay bridge.

Wassaic, N. Y., unstated tonnage, Wassaic State school.

Woodbridge, N. J., 524 tons, sewage disposal plant; bids June 22.

Jones Beach, N. Y., unstated tonnage, bars and mesh for bridges and highway construction; bids June 26.

South Haven, Mich., tonnage being estimated, sewage treating plant.

State of Illinois, 200 tons, county road, bridge and culvert work.

Oakland, Cal., 135 tons, outer harbor work; general contract awarded.

Sonoma, Cal., 100 tons, reservoir; bids rejected; new bids June 28.

Los Angeles County, 269 tons, materials only for conduit on Ballona Creek; bids June 19.

Last Minute Sales Leads

(Received too late for classification in our Plant Expansion Section)

Michigan Seamless Tube Co., West Avenue, South Lyon, Mich., manufacturer of seamless steel tubing, has approved plans for one-story addition, 50 x 200 ft. Cost over $65,000 with equipment.

Humble Pipe Line Co., Houston, Tex., an interest of Humble Oil & Refining Co., same place, plans early construction of new tank farm and pumping plant on 20-acre tract near Tomball, Tex., recently acquired. Cost about $60,000 with steel tanks, pumping machinery, pipe line connections, etc.

Crescent Brewing Co., Joplin, Mo., care of Truman E. Martinie, 916 North Jackson Street, architect, is planning new plant, with multi-story brew-house, bottling works and refrigerating plant, boiler house, etc. Cost about $400,000 with equipment.

United States Engineer Office, P. O. Box 97, Memphis, Tenn., asks bids until June 20 for rough steel castings (Circular 586).

City Council, Cedar Falls, Iowa, is planning erection of new municipal gas generating plant. Cost about $85,000 with equipment. C. H. Streeter, city engineer, in charge.

Arthur Rosenstein, 120 Milk Street, Boston, architect, has plans for extensions and improvements in brewery on Hillman Street, New Bedford, Mass., for company whose name is temporarily withheld. New equipment will be purchased. Cost over $150,000 with machinery.

Board of City Directors, Pasadena, Cal., asks bids until June 20 for pier plates and auxiliary equipment for spillway gates for Pine Canyon dam, including 84 tons semi-steel pier plate castings, and about 1½ tons anchors, bolts, etc. Samuel B. Morris, chief engineer and water superintendent.

Constructing Quartermaster, Benton Field, Cal., asks bids until July 6 for new one-story engineering shop. Cost about $243,000 with equipment, etc. (Specification 9435-D).

Leisy Brewing Co., Cleveland, care of G. A. Mueller, 1346 Broadway, Detroit, architect, has plans for new multi-story brewing and bottling plant, with power house, machine shop and other departments, at Cleveland. Cost about $500,000 with equipment.

Dewey Portland Cement Co., 101 West Eleventh Street, Kansas City, Mo., has plans for one-story addition to mill at Dewey, Okla., 75 x 170 ft., for storage and distribution, with traveling crane and other mechanical-handling equipment. Cost about $30,000. J. G. Mathews, Commercial Building, Tulsa, Okla., is engineer.

Superintendent of Lighthouses, St. George, Staten Island, N. Y., asks bids until June 20 for two 75-fathom cables, 1¼-in. wrought iron stud link chain cables, approximate weight 13,588 lb. (Proposal 43878).

Klamath Brewing Co., Klamath Falls, Ore., has plans for extensions and improvements. Cost about $80,000 with equipment. J. W. DeYoung, 350 Salmon Street, Portland, is architect. Christopher Blanos is president.

United States Engineer Office, Vicksburg, Miss., asks bids until June 21 for 50 cast steel double bitts (Circular 261).

Bailey Products Corpn., Union City, Ind., has acquired Clark Screw Products Co., Springfield, Ohio. Equipment has been moved to Union City plant. G. A. Thomas is president and general manager of Bailey Products Corpn.

OBITUARY

ARTHUR E. BAKER, president, Baker Brothers, Inc., Toledo, manufacturer of drilling machinery, died June 2, aged 76 years. He had been active in the company's business until shortly

A. E. BAKER

before his death. The business of which Mr. Baker was the head was established by his brother, the late Herbert Baker. The deceased joined this organization in 1882. He had been president of the company for a number of years.

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JOSEPH J. TYNAN, vice-president of the Bethlehem Steel Co., died at his home in San Francisco on June 6 after an illness of several months of a heart ailment. Soon after coming to this country from Ireland he went to work in the Philadelphia shipyards, where he rapidly rose until in 1906 the Bethlehem Shipbuilding Corpn. sent him to San Francisco to head the Union Iron Works. Later he was made vice-president of the Bethlehem Shipbuilding Corpn., in charge of all Pacific Coast plants. He retained this position until last year when he was made vice-president of the Bethlehem Steel Co. Mr. Tynan's activity during the war won him national recognition and led Charles M. Schwab to describe him as "the greatest shipbuilder in the world."

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FRANCIS B. QUACKENBOSS, purchasing agent for the Graton & Knight Mfg. Co., Worcester, Mass., died on June 5 at Atlantic City. He was born in Worcester 42 years ago. Mr. Quackenboss was graduated from Dartmouth College in 1911, and in the following year became assistant to the president of the Graton & Knight Mfg. Co.

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JOEL DICKINSON, for many years connected with crucible steel manufacture in New Jersey, died on May 29 at Flemington, N. J., aged 78 years. He was born in Sheffield, England, and belonged to a family of steel mill men. Coming to the United States as a youth, he entered the employ of his uncle, the late Benjamin Illingworth of the old-time Jersey City Steel Works. Later he was connected with the forging department of what is now the Harrison plant of the Crucible Steel Co. of America and while there took out a number of process patents. As a contractor, he produced large tonnages of shell steel in the years of the world war.

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ROBERT W. FLENNIKEN, treasurer of the Hillman Coal & Coke Co., Pittsburgh, and an officer in a number of subsidiaries and affiliated companies, died in that city on June 7, aged 63 years. He had been active in the coal and iron trade in the Pittsburgh district for many years, and was associated with the old Cherry Valley Iron Co., Leetonia, Ohio, before becoming identified with the Hillman organization.

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T. G. BUSH, Jr., general manager of the Somerville Iron Co., Chattanooga, Tenn., died suddenly on June 6. He was a son of the late T. G. Bush, one of Birmingham's pioneer industrial developers, and a brother of the late Morris Bush, who was president of the Alabama By-Products Corpn., Birmingham.

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GEORGE M. NORTH, treasurer and a director of the Ferry Cap & Set Screw Co., Cleveland, died June 9, aged 78 years. He was a native of Cleveland and the greater part of his business life was spent in the sales organization of the Lamson & Sessions Co., Cleveland.

Unfilled Steel Orders Gain 65,241 Tons

Unfilled orders of the United States Steel Corpn. increased 65,241 tons in May, registering the second gain since October, 1932, the first—an increase of 32,572 tons—having occurred in the previous month. The May gain was made despite a sharp increase in operations and shipments. Unfilled orders as of May 31 were 1,929,815 tons against 1,864,574 tons at the end of April. Unfilled orders at the end of each month since 1930 follow:

	1933 Tons	1932 Tons	1931 Tons
January	1,898,644	2,648,150	4,132,351
February	1,854,200	2,545,629	3,965,194
March	1,841,002	2,472,413	3,995,330
April	1,864,574	2,326,926	3,897,729
May	1,929,815	2,177,162	3,620,452
June	.....	2,034,768	3,479,323
July	.....	1,966,302	3,407,816
August	.....	1,969,595	3,169,457
September	.....	1,985,090	3,144,833
October	.....	1,997,040	3,119,432
November	.....	1,968,301	2,933,891
December	.....	1,968,140	2,735,353

Locomotive Orders

WASHINGTON, June 13.—One electric railroad locomotive for domestic use was shipped in May, according to reports made to the Bureau of the Census by manufacturers. Unfilled orders at the end of May consisted of 66 electric and one steam locomotive.

Coming Meetings

American Institute of Bolt, Nut and Rivet Manufacturers. June 16. National convention. Waldorf-Astoria Hotel, New York. James D. Eggers, 1520 Guardian Building, Cleveland, secretary.

American Foundrymen's Association. June 20 to 23. Annual convention and exhibition, Hotel Stevens, Chicago. C. E. Hoyt, 222 West Adams Street, Chicago, secretary.

American Society of Mechanical Engineers. June 26 to 30. Semi-annual meeting, Hotel Stevens, Chicago. Calvin W. Rice, 29 West Thirty-ninth Street, New York, secretary.

American Society for Testing Materials. June 26 to 30. Annual meeting, Hotel Stevens, Chicago. C. L. Warwick, 1315 Spruce Street, Philadelphia, secretary.

American Institute of Mining and Metallurgical Engineers. June 29 and 30. Open-hearth meeting, Stevens Hotel, Chicago. L. F. Reinartz, American Rolling Mill Co., Middletown, Ohio, chairman.

Society of Industrial Engineers. June 27 to 30. Annual meeting, Hotel Stevens, Chicago. George C. Dent, 205 West Wacker Drive, Chicago, secretary.

Midwest Engineering and Power Exposition. June 26 to 30. Sixth annual exhibition, Stevens Hotel, Chicago. Headquarters, 308 West Washington Street, Chicago.

National Industrial Advertisers Association. June 26 to 30. Eleventh annual convention. Medinah Athletic Club, Chicago. Stuart G. Phillips, Dole Valve Co., Chicago, secretary-treasurer.

THE first cargo of steel to be shipped entirely by water from Chicago steel mills to New Orleans is on its way. The cargo consists of 1200 tons of steel sheet piling produced by the Inland Steel Co., Chicago.

Purchasing Agents Discuss Fundamentals at Convention

THE annual convention and "Informa-show" of the National Association of Purchasing Agents was held in Boston this week from Monday to Thursday, inclusive. The theme of the meeting was "Build on Fundamentals" and the program, as carried out, was designed to aid those present in building on sound fundamental lines in terms of present day conditions.

Of particular interest to the metalworking industry were the papers presented by Frank Parrish, Supervisor of inventories, U. S. Steel Corpn., James H. Marks, purchasing supervisor, Packard Motor Car Co., and Frederick J. Heaslip, assistant purchasing agent, Fairbanks, Morse & Co.

Mr. Parrish's paper was entitled "The Cost of Carrying Inventory." In it he developed the somewhat overlooked fact that carrying cost is frequently much greater than it actually appears or than the charges written against it.

"Recently 11 different companies were requested," said Mr. Parrish, "to furnish lists of all items which had been carried in inventory for one year or longer, still having prospective use. Several thousand items of all kinds of material were listed. The combined original cost was $237,-632.00. The combined intrinsic value at time of report was appraised at $54,572.00, leaving a total depreciation of $183,060.00, or 77 per cent of original cost. These items were held for terms ranging from one to 21 years, the weighted average time of holding being 8.9 years. The cumulative rate of depreciation, for 8.9 years would be about 85 per cent while the cumulative expense rate for the same length of time would be about 42.5 per cent.

"In my opinion there is no question of there being a cumulative expense in connection with these items amounting to as much as 42.5 per cent, and I am also very much of the opinion that, had the materials been actually sold or liquidated, the depreciation would have amounted to considerably more than 77 per cent."

The accompanying table showing average expense and depreciation costs in carrying undesirable materials over a term of years, which formed a part of Mr. Parrish's paper, will be of interest.

Time Analysis the Basis of Inventory Control

"Control of Production Materials" was the title of Mr. Marks's paper. In it he described the steps toward control through the establishment of a time analysis covering all materials and purchased parts and next the determination of economical quantities.

"The major steps in a Time Analysis," said Mr. Marks, "are first, the receipt of a manufacturing program or instructions; second, performing the function of writing requisitions or bills of material; third, scheduling the requisitions so that the buyer may advise the vendor when the materials will have to be delivered; fourth, negotiating the purchase; fifth, issuing the purchase orders or making the contracts; sixth, making certain that the vendor will deliver the material as per schedule; seventh, receiving the material; eighth, delivering it to those departments which use it either directly or by re-fabrication; ninth, assembling into the finished product; and tenth, delivering to the customer or transportation company.

"The next question is the one of economical quantities. Many times the quantity to be manufactured under the provision of the program is so small that it does not constitute an economical quantity in which to purchase some of the materials required. In other cases the program is so large that the buying of this additional quantity all at once rather hinders the purchase instead of helping it. In other words it may throw a large demand on perhaps a feeble market when the condition of the market would be such later on that continual purchases of smaller quantities over a given period would result in a lower price than the purchase of the entire quantity at one time."

"Advantages and Disadvantages of Hand-to-Mouth Buying" was the subject covered by Mr. Heaslip.

"While the odds seem to be in favor of hand-to-mouth buying generally," said the author, "there will be many complaints against this practice by innumerable vendors for the reason that in many instances the policy is carried to the extreme and unreasonable requests are made pertaining both to price and delivery."

Percentages of original cost (100 per cent to be used for computing estimated losses from Expense and Depreciation in carrying materials for contingent use. Figures adjusted slightly to avoid extended fractions. Annual Expense rate—10 per cent. Annual Depreciation rate—20 per cent. Both rates applied to the annually depreciated asset value bases.

Year	Estimated Expense Percentage	Estimated Depreciation Percentage	Estimated Total Cost Percentage	Per Cent of Cumulative Cost at End of Year	Per Cent of Remaining Value at End of Year	Per Cent of Remaining Value to Cumulative Cost
1	10.0	20.0	30.0	110.0	80.0	72.7
2	8.0	16.0	24.0	118.0	64.0	54.2
3	6.4	12.8	19.2	124.4	51.2	41.1
4	5.1	10.2	15.3	129.5	41.0	31.7
5	4.1	8.2	12.3	133.6	32.8	24.6
6	3.3	6.6	9.9	136.9	26.2	19.1
7	2.6	5.2	7.8	139.5	21.0	15.1
8	2.1	4.2	6.3	141.6	16.8	11.9
9	1.7	3.4	5.1	143.3	13.4	9.4
10	1.3	2.7	4.0	144.6	10.7	7.4
11	1.1	*0.7	1.8	145.7	*10.0	6.9
12	1.0	0.0	1.0	146.7	10.0	6.7

*10 per cent assumed to represent scrap value, leaving no further depreciation to be deducted.

EXPENSE includes interest, insurance, taxes, storage, accounting, extra handling, etc.

DEPRECIATION includes deterioration, obsolescence, shrinkage and any other factor that reduces value, impairs efficiency, or induces the illogical or uneconomical use of material.

Surplus, obsolete or discarded materials are undesirable materials; materials ordered for contingent use become undesirable materials in the majority of cases.

Machine Tool Orders Gained in May

May registered a gain of 50 per cent in machine tool orders as compared with April of this year, according to the National Machine Tool Builders' Association, Cleveland. New orders increased from 15.3 per cent, the April rating, to 24 per cent last month. Good inquiries are reported for the first ten days of June. Some sellers are putting out quotations with a 30-day acceptance limit, in view of probable price rises.

Sauveur Testimonial Dinner Postponed

Because of the meetings of the several engineering societies in Chicago, June 26-30, the Sauveur testimonial dinner planned for June 20 has been postponed until fall. Announcement of the exact date will be made later.

Rail Purchases

Los Angeles has awarded 600 tons of rails to United Commercial Co.

Seattle has taken bids on 500 tons of rails.

Tin, Lead Prices Advance Further on Unabated Consumer Buying

Spot Straits Tin Climbs to 46c.; Lead Up $2 a Ton—Copper Encounters Lull; Zinc Moderately Active

NEW YORK, June 13.—Trading in the domestic copper market has slackened, reaching a virtual standstill. Important consumers are amply covered for 30 to 60 days. There is no speculative purchasing in evidence, and buying in the past seven-day period was practically limited to spot covering for actual needs. Shipping releases against old contracts are coming in more frequently from fabricators, who are experiencing a continuance of good demand from ultimate consumers. Electrolytic copper is fairly firm at 8c. a lb., delivered Connecticut. A few cash sales at 7.87½c., delivered, failed to affect the general price situation. A prospective meeting of producers at New York late this week for shaping a program for the industry in connection with the industrial recovery act is held to presage higher prices in the early future. Some restrictions, it is contended, will have to be provided for limiting copper production before definite price stabilization can be accomplished. A higher price level, according to trade views, could not be maintained with uncontrolled production, and restricted output will therefore probably be the keynote of the forthcoming conference.

European buyers have assumed a waiting attitude, pending first developments of the international economic conference. Activity during the week was therefore apathetic. Continental values eased off slightly, the range for the week having been downward from 7.90c. to today's quotation of 7.75c. a lb., c.i.f. usual European ports.

Tin

Heavy consumer buying for nearby delivery and further dollar depreciation accounted for a net advance of 3⅞c. a lb. in the past seven-day period in the price of spot Straits at New York, which today hovered around 46c. Forward metal is also being booked for delivery through September. The bulk of demand continues from the tin plate industry, which is operating at 90 per cent of capacity. Requirements of miscellaneous consuming lines are also in good volume. The urgent character of recent buying is considered to be a sharp indication of the short position of consumer inventories. Exceptionally active trading in spot standard in London during the period was ascribed to an expanding demand from American buyers for English refined tin, which is available here at 3c. a lb. under the spot Straits price. Tin values in London again sought higher levels, with today's postings £224 a ton for spot standard, £224 for future standard, and £243 for spot Straits. The Singapore market scored an extraordinary advance of about £22 for the week, having reached £242 5s. a ton today. Relatively heavy withdrawals for consignment to the United States effected a shrinkage last week of 1048 tons in United Kingdom warehouse stocks, which now stand at 23,589 tons.

Lead

Prices absorbed further strength from an unabated consumer demand, and the leading producers on June 9 advanced their contracting bases $2 a ton to 4.05c., St. Louis, and 4.20c., New York. As a result of heavy bookings during the past three weeks, the leading mid-Western factor has sold its entire production for June and July. Consumer requirements for June are practically all covered, while about 85 per cent of July needs is provided for. Demand continues from virtually every lead consuming industry, with calls particularly brisk from battery makers, oxide manufacturers and corroders. Based on recent sales, deliveries of lead during July are expected to approximate 28,000 tons. Relatively heavy shipments during June are expected to effect a reduction in smelters' stocks at the close of the month.

Zinc

Demand has improved. Sales during the past week totaled slightly more than 5000 tons, involving deliveries through September. Prices continue irregular. Offerings are still available at 4.30c., East St. Louis, or 4.67c., New York. Some non-competitive business has been booked at 4.32½c. to 4.35c., East St. Louis. Galvanizers are the chief consuming factors in this market, while tube manufacturers are steadily increasing their specifications. An increase of 3000 tons in unfilled orders at the end of May, as disclosed by May statistics published by the American Zinc Institute, reflected the short position of consumers. Shipments during that month totaled 27,500 tons, an increase of about 8100 tons over April deliveries.

The Week's Prices. Cents Per Pound for Early Delivery

	June 7	June 8	June 9	June 10	June 12	June 13
Electrolytic copper, N. Y.*	7.75	7.75	7.75	7.75	7.75	7.75
Lake copper, New York	8.00	8.00	8.00	8.00	8.00	8.00
Straits tin, Spot, N. Y.	43.25	45.37½	45.12½	....	45.37½	46.00
Zinc, East St. Louis	4.30	4.30	4.30	4.30	4.30	4.30
Zinc, New York	4.67	4.67	4.67	4.67	4.67	4.67
Lead, St. Louis	3.95	3.95	4.05	4.05	4.05	4.05
Lead, New York	4.10	4.10	4.20	4.20	4.20	4.20

*Refinery quotations; price ¼c. higher delivered in Connecticut.

Aluminum, 98 to 99 per cent pure, 22.90c. a lb., delivered.
Nickel electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.
Antimony, 6.50c. a lb., New York.
Brass ingots, 85-5-5-5, 8c. a lb., New York and Philadelphia.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	47.00c. to 48.00c.
Tin, bar	49.00c. to 50.00c.
Copper, Lake	9.00c. to 9.75c.
Copper, electrolytic	8.75c. to 9.25c.
Copper, castings	8.50c. to 9.50c.
*Copper sheets, hot-rolled	15.62½c.
*High brass sheets	13.25c.
*Seamless brass tubes	14.87½c.
*Seamless copper tubes	15.12½c.
*Brass rods	10.75c.
Zinc, slabs	5.50c. to 6.00c.
Zinc sheets (No. 9), casks	9.25c. to 9.50c.
Lead, American pig	4.87½c. to 5.87½c.
Lead, bar	6.25c. to 7.25c.
Lead, sheets	7.75c.
Antimony, Asiatic	8.00c. to 9.00c.
Alum., virgin, 99 per cent plus	23.30c.
Alum. No. 1 for remelting, 98 to 99 per cent	18.00c. to 19.00c.
Solder, ½ and ½	29.00c. to 30.00c.
Babbitt metal commercial grade	25.00c. to 50.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	49.12½c.
Tin, bar	51.12½c.
Copper, Lake	9.12½c.
Copper, electrolytic	9.12½c.
Copper, casting	8.50c.
Zinc, slab	5.75c. to 6.00c.
Lead, American pig	5.35½c. to 5.50c.
Lead, bar	8.50c.
Antimony, Asiatic	8.50c.
Babbitt metal, medium grade	18.50c.
Babbitt metal, high grade	53.12½c.
Solder, ½ and ½	27.50c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	6.50c.	7.00c.
Copper, hvy. and wire	6.25c.	7.00c.
Copper, light and bottoms	5.00c.	5.87½c.
Brass, heavy	3.50c.	4.25c.
Brass, light	2.75c.	3.50c.
Hvy. machine composition	4.87½c.	5.50c.
No. 1 yel. brass turnings	4.00c.	4.62½c.
No. 1 red brass or compos. turnings	4.75c.	5.25c.
Lead, heavy	3.25c.	3.75c.
Zinc	2.25c.	2.75c.
Cast aluminum	6.50c.	7.50c.
Sheet aluminum	11.75c.	13.50c.

Prices of Finished and Semi-Finished Steel, Coke, Coal, Cast Iron Pipe

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
Del'd Philadelphia	1.91c.
Del'd New York	1.95c.
Del'd Detroit	1.80c.
F.o.b. Cleveland	1.65c.
F.o.b. Lackawanna	1.70c.
F.o.b. Birmingham	1.75c.
C.i.f. Pacific ports	2.10c.

Billet Steel Reinforcing

(Cut lengths as quoted by distributers)

F.o.b. P'gh mills	1.75c.
F.o.b. Birmingham	1.75c.
F.o.b. Cleveland	1.75c. to 1.90c.

Rail Steel

F.o.b. mills, east of Chicago dist.	1.50c.
F.o.b. Chicago Heights mills	1.50c.

Iron

Common iron, f.o.b. Chicago	1.60c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	1.86c.
Common iron, del'd New York	1.90c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	1.50c. to 1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.75c.
Del'd Cleveland	1.8035c.
Del'd Philadelphia	1.4935c. to 1.5935c.
F.o.b. Coatesville	1.40c. to 1.50c.
F.o.b. Sparrows Point	1.40c. to 1.50c.
Del'd New York	1.598c. to 1.698c.
C.i.f. Pacific ports	2.00c.
Wrought iron plates, f.o.b. P'gh	3.00c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.75c.
F.o.b. Lackawanna	1.70c.
F.o.b. Bethlehem	1.70c.
Del'd Cleveland	1.8035c.
Del'd Philadelphia	1.7495c.
Del'd New York	1.86775c.
C.i.f. Pacific ports (standard)	2.10c.
C.i.f. Pacific ports (wide flange)	2.20c.

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	1.90c.
F.o.b. Chicago mill	2.05c.
F.o.b. Buffalo	2.00c.

Alloy Steel Bars

(F.o.b. Pittsburgh, Chicago, Buffalo, Massillon or Canton.)

Alloy Quantity Bar Base, 2.45c. to 2.65c. per Lb.

S.A.E. Series Numbers	Alloy Differential per 100 Lb.
2000 (1½% Nickel)	$0.25
2100 (1½% Nickel)	0.55
2300 (3½% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
6100 Chromium Spring Steel	0.20
6100 Chromium Vanadium Bar	1.20
6100 Chromium Vanadium Spring Steel	0.95
9250 Silicon Manganese Spring Steel (flats)	0.25
Rounds and Square	0.50
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

Above prices are for hot-rolled steel bars, forging quality. The differential for cold-drawn bars is ¾c. a lb. higher, with standard classification for cold-finish alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a section area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2½ in. thick, regardless of sectional area, take the bar price.

Cold Finished Bars*

Bars, f.o.b. Pittsburgh Mill	1.70c.
Bars, f.o.b. Chicago	1.75c.
Bars, Cleveland	1.75c.
Bars, Buffalo	1.75c.
Bars, Detroit	1.90c.
Bars, eastern Michigan	1.95c.
Shafting, ground, f.o.b. mill, 1½ in.	3.00c.
1-3/16 to 1½ in.	2.50c.
1-9/16 to 1¾ in.	2.35c.
1-15/16 to 2½ in.	2.20c.
2-15/16 to 6 in.	2.05c.

* In quantities of 10,000 to 19,999 lb.

SHEETS, STRIP, TIN PLATE TERNE PLATE

Sheets

Hot-Rolled

No. 10, f.o.b. Pittsburgh	1.50c. to 1.65c.
No. 10, f.o.b. Chi'o mill	1.60c. to 1.75c.
No. 10, del'd Philadelphia	1.81c. to 1.96c.
No. 10, f.o.b. Birming'm	1.65c. to 1.80c.
No. 10, c.i.f. Pacific Coast Ports	2.12½c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.10c. to 2.25c.
No. 24, f.o.b. Chi'o mills	2.20c. to 2.35c.
No. 24, del'd Philadelphia	2.41c. to 2.56c.
No. 24, f.o.b. Birming'm	2.25c. to 2.40c.
No. 24, c.i.f. Pacific Coast ports	2.75c.
No. 24, wrought iron, Pittsburgh	4.30c.

Heavy Cold-Rolled (Mill Run)

No. 10 gage, f.o.b. Pitts'h	1.80c to 1.95c.
No. 10 gage, f.o.b. Chicago mills	1.90c. to 2.05c.
No. 10 gage, del'd Phila.	2.11c. to 2.26c.
No. 10 gage, del'd Pacific Coast ports	2.70c.

Light Cold-Rolled (Mill Run)

No. 20 gage, f.o.b. Pitts'h	2.25c. to 2.40c.
No. 20 gage, f.o.b. Chicago mills	2.35c. to 2.50c.
No. 20 gage, del'd Phila.	2.56c. to 2.71c.
No. 20 gage, del'd Pacific Coast ports,	2.95c.

Auto Body and Steel Furniture

No. 10, f.o.b. Pittsburgh	2.00c. to 2.15c.
No. 20, f.o.b. Pittsburgh	2.45c. to 2.60c.
No. 20, f.o.b. Chicago	2.55c. to 2.70c.

Galvanized Sheets

No. 24, f.o.b. Pittsburgh	2.70c. to 2.85c.
No. 24, f.o.b. Chicago mills	2.95c.
No. 24, del'd Philadelphia	3.16c.
No. 24, f.o.b. Birmingham	2.85c.
No. 24, c.i.f. Pacific Coast ports	3.25c.
No. 24, wrought iron, Pittsburgh	4.95c.

Long Terne

No. 24, unassorted, 8-lb. coating f.o.b. Pittsburgh	2.75c. to 2.90c.

Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh	2.90c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.30c.
No. 28, Chicago mill	2.40c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. P'gh district mill	$4.25
Standard cokes, f.o.b. Gary	4.35

Terne Plate

(*F.o.b. Morgantown or Pittsburgh*)
(Per Package, 20 x 28 in.)

8-lb. coating I.C.	$8.70
15-lb. coating I.C.	11.00
20-lb. coating I.C.	11.90
25-lb. coating I.C.	13.00
30-lb. coating I.C.	13.80
40-lb. coating I.C.	15.30

Hot-Rolled Hoops, Bands, Strips and Flats under ¾ In.

	Base per Lb.
All widths up to 24 in., Pittsburgh	1.55c. to 1.60c.
All widths up to 24 in., Chicago	1.65c. to 1.70c.
Cooperage stock, P'gh	1.55c. to 1.60c.
Cooperage stock, Chicago	1.65c. to 1.70c.

Cold-Rolled Strips

F.o.b. Pittsburgh	2.00c.
F.o.b. Cleveland	1.80c. to 2.00c.
Del'd Chicago	2.30c.
F.o.b. Worcester	2.15c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland	2.60c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

Extras of 10c. a 100 lb. on mixed and joint carloads, 20c. on pool carloads and 30c. on less than carloads are applied on all merchant wire products. In carloads and mixed carloads a discount of 10 per cent on extras is allowed.

To Manufacturing Trade

Bright wire	2.10c.
Spring wire	3.10c.

To Jobbing Trade

	Base per Keg
Standard wire nails	$1.85
Smooth coated nails	1.85
Galvanized nails	2.35
	Base per 100 Lb.
Smooth annealed wire	$2.25
Smooth galvanized wire	2.60
Polished staples	2.55
Galvanized staples	2.50
Barbed wire, galvanized	2.35

Woven wire fence No. 9 gage, base column, per net ton $50.00

Chicago and Anderson, Ind., mill prices are $1 a ton over Pittsburgh base; Duluth, Minn. and Worcester, Mass., mill $2 a ton over Pittsburgh, and Birmingham mill $3 a ton over Pittsburgh.

STEEL AND WROUGHT PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio Mills

Butt Weld

Steel Inches	Black	Galv.	Wrought Iron Inches	Black	Galv.
⅛	55	33	⅛	+91½	+138
¼ to ⅜	60½	42	¼ & ⅜	+1½	+21½
½	65½	51	½	31½	15
¾	69	59	¾	36½	20½
1 to 3	71	62	1 & 1¼	39½	25½
			1½	43½	28
			2	41½	26

Lap Weld

2	66	57	2	37	22½
2½ to 6	69½	60½	2½ to 3½	38	25
7 and 8	68	58	4 to 8	40	28½
9 and 10	67	57	9 to 12	38	24½
11 and 12	66	56			

Butt Weld, extra strong, plain ends

⅛	52	37	⅛	+13	+45½
¼ to ⅜	58	45	¼ & ⅜	+2½	+34½
½	63½	54½	½	32½	17½
¾	68	59	¾	37½	22½
1 to 3	70	62	1 to 2	43½	29

Lap Weld, extra strong, plain ends

2	65	57	2	40	26
2½ to 6	69	61	2½ to 4.45	½	33
7 to 8	68	58	4½ to 6.45		32½
9 and 10	67	57	7 & 8	46	33
11 and 12	66	56	9 to 12	41½	30

Discounts on steel and wrought iron pipe are net and not subject to any points or preferentials.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel		Charcoal Iron	
2 in. and 2¼ in.	38	1½ in.	1
2½ in.—2¾ in.	46	2 in.—2¼ in.	13
3 in.	52	2½ in.—2¾ in.	16
3¼ in.—4¾ in.	54	3 in.	17
4 in.	57	3¼ in. to 3½ in.	18
4½ in. to 6 in.	46	4 in.	20
		4½ in.	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold-Drawn

1 in.	61	3 in.	46
1¼ to 1½ in.	53	3¼ to 3½ in.	48
1¾ in.	37	4 in.	51
2 to 2¼ in.	32	4½, 5 and 6 in.	40
2½ to 2¾ in.	40		

Hot Rolled

2 and 2¼ in.	38	3¼ to 3½ in.	54
2½ and 2¾ in.	46	4 in.	57
3 in.	52	4½, 5 and 6 in.	46

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb. base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. in lighter than standard gages take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30% base (carloads)	55
Carbon, 0.30% to 40% base	50

Plus differential for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

RAILS AND TRACK SUPPLIES

Rails

	Per Gross Ton
Standard, f.o.b. mill	$40.00
Light (from billets), f.o.b. mill	30 00
Light (from rail steel, f.o.b. mill)	26 00

Track Equipment

	Base per 100 Lb.
Spikes, 9/16 in. and larger	$2.15
Spikes, ½-in. and larger	2.30
Spikes, boat and barge	2.60
Tie plates, steel	1.75
Angle bars	2.55
Track bolts, to steam railroads	3.50
Track bolts, to jobbers, all sizes, (per 100 count)	73 per cent off list

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine bolts	73
Carriage bolts	73
Lag bolts	73
Plow bolts, Nos. 1, 2, 3 and 7 heads	73
Hot-pressed nuts, blank or tapped, square	73
Hot-pressed nuts, blank or tapped, hexagons	73
C.p.c. and t. square or hex nuts, blank or tapped	73
Semi-finished hexagon nuts	73
Semi-finished hexagon castellated nuts, S.A.E.	73
Stove bolts in packages, P'gh.	72½, 25 and 10
Stove bolts in packages, Ch'go.	72½, 25 and 10
Stove bolts in pkgs., Cleveland.	72½, 25 and 10
Stove bolts in bulk, P'gh.	85
Stove bolts in bulk, Chicago	85
Stove bolts in bulk, Cleveland	85
Tire bolts	60 and 10

Discounts of 75 per cent off on bolts and nuts applied on carload business with jobbers and large consumers.

Large Rivets

(½-in. and larger)

	Base per Lb.
F.o.b. Pittsburgh or Cleveland	$2.25
F.o.b. Chicago	2.35

Small Rivets

(7/16-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70, 10 and 10
F.o.b. Cleveland	70, 10 and 10
F.o.b. Chicago	70, 10 and 10

Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws, 1 in. dia. and smaller	85
Milled standard set screws, case hardened, 1 in. dia. and smaller	80
Milled headless set screws, cut thread ¾ in. and smaller	75 and 10
Upset hex. head cap screws, U.S.S.S. or S.A.E. thread, 1 in. dia. and smaller	85 and 10
Upset set screws, sq. head	80
Milled studs	70

SEMI-FINISHED STEEL

Billets and Blooms

	Per Gross Ton
Rerolling, 4-in. to 6-in., inclusive Pittsburgh	$26.00
Rerolling, 4-in. to 6-in., inclusive Youngstown	26.00
Rerolling, 4-in. to 6-in., inclusive Cleveland	26.00
Rerolling, 4-in. to 6-in., inclusive Chicago	26.00
Forging quality, Pittsburgh	31.00
Forging quality, Youngstown	31.00

Sheet Bars

(Open-Hearth or Bessemer)

	Per Gross Ton
Pittsburgh	$26.00
Youngstown	26.00
Cleveland	26.00

Slabs

(3 in. x 2 in. and under 10 in. x 10 in.)

	Per Gross Ton
Pittsburgh	$26.00
Youngstown	26.00
Cleveland	26.00

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Skelp

(F.o.b. Pittsburgh or Youngstown)

	Per Lb.
Grooved	1.60c.
Universal	1.60c.
Sheared	1.60c.

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	$35.00
Cleveland	35.00
Chicago	36.00

COKE, COAL AND FUEL OIL

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville Prompt	$1.75 to $2.00
Foundry, f.o.b. Connellsville Prompt	2.50 to 4.00
Foundry, by-product, Chicago ovens, for delivery outside switching districts	7.00
Foundry, by-product, delivered in Chicago switching district	7.75
Foundry, by-product, New England, delivered	10.00
Foundry, by-product, Newark or Jersey City, del'd	8.20 to 8.81
Foundry, by-product, Phila.	8.50
Foundry, by-product, Cleveland, delivered	7.82
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry, by-product, del'd St. Louis	9.00

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.10 to $1.20
Mine run coking coal f.o.b. W. Pa.	1.20 to 1.40
Gas coal, ¾-in., f.o.b. Pa. mines	1.30 to 1.40
Mine run gas coal, f.o.b. Pa. mines	1.30 to 1.40
Steam slack, f.o.b. W. Pa. mines	0.45 to 0.55
Gas slack, f.o.b. W. Pa. mines	0.65 to 0.75

Fuel Oil

Per Gal. f.o.b. Bayonne, N. J.

No. 3 distillate	4.00c.
No. 4 industrial	3.50c.

Per Gal. f.o.b. Baltimore

No. 3 distillate	4.00c.
No. 4 industrial	3.50c.

Per Gal. del'd Chicago

No. 3 industrial fuel oil	3.25c.
No. 5 industrial fuel oil	2.65c. to 2.75c.

Per Gal. f.o.b. Cleveland

No. 3 distillate	5.00c.
No. 4 industrial	4.50c.

REFRACTORIES

Fire Clay Brick

	Per 1000 f.o.b. Works High-heat Duty Brick	Intermediate Duty Brick
Pennsylvania	$40.00	$35.00
Maryland	40.00	35.00
New Jersey	50.00	38.00
Ohio	40.00	35.00
Kentucky	40.00	35.00
Missouri	40.00	35.00
Illinois	40.00	35.00
Ground fire clay, per ton	7.00	

Chrome Brick

	Per Net Ton
Standard size	$42.50 to $45.00

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$40.00
Chicago	49.00
Birmingham	50.00
Silica clay, per ton	8.00

Magnesite Brick

	Per Net Ton
Standard sizes, burned, f.o.b. Baltimore and Chester, Pa.	$65.00
Unburned, f.o.b. Baltimore	52.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00
Domestic, f.o.b. Chewelah, Wash.	22.00

CAST IRON PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$43.40 to $44.40
4-in., del'd Chicago	46.40 to 47.40
6-in., and larger, del'd New York	38.30
4-in., del'd New York	41.30
6-in., and larger, Birmingham	$35.00 to 36.00
4-in., Birmingham	38.00 to 39.00

Class "A" and gas pipe, $3 extra.

Pig Iron, Ores, Ferroalloys

VALLEY

Per Gross ton f.o.b. Valley furnace:

Basic	$15.00
Bessemer	16.00
Gray forge	15.50
No. 2 foundry	15.50
No. 3 foundry	15.00
Malleable	15.50
Low phos., copper free	23.00

Freight rate to Pittsburgh or Cleveland district, $1.89.

PITTSBURGH

Per gross ton, f.o.b. Pittsburgh district furnace:

Basic	$15.50
No. 2 foundry	16.00
No. 3 foundry	15.50
Malleable	16.00
Bessemer	16.50

Freight rates to points in Pittsburgh district range from 69c. to $1.26.

CHICAGO

Per gross ton at Chicago furnaces:

N'th'n No. 2 fdy.	$16.00
N'th'n No. 1 fdy.	16.50
Malleable, not over 2.25 sil.	16.00
High phosphorus	16.00
Lake Super. charcoal, sil. 1.50, by rail	23.17
Southern No. 2 fdy.	$16.14 to 17.14
Low. phos., sil. 1 to 2, Copper free.	25.00
Silvery, sil. 8 per cent	24.92
Bess. ferrosil'n, 15 per cent	28.92

Prices are delivered consumers' yards except on Northern foundry, high phosphorous and malleable, which are f.o.b. local furnaces, not including a switching charge.

ST. LOUIS

Per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	$16.00
Del'd St. Louis	16.85
Malleable, f.o.b. Granite City	16.50
Northern No. 2 fdy., del'd St. Louis	18.30
Northern malleable, del'd	18.30
Northern basic, del'd	18.30
Southern fdy., sil. 1.75 to 2.25 del'd St. Louis	16.35

Freight rates, 83c (average) Granite City to St. Louis; $2.30 from Chicago; $4.56 from Birmingham.

NEW YORK

Per Gross ton, delivered New York district:

*Buffalo, No. 2, del'd Eastern N. J.	$17.41
Buffalo malleable, del'v'd Eastern N. J.	17.91
East Pa. No. 2 fdy.	17.02
East Pa. No. 2X fdy.	17.52

Freight rates: $1.52 to $2.63 from eastern Pennsylvania.

*Prices delivered to New Jersey cities having rate of $3.41 a ton from Buffalo.

BUFFALO

Per gross ton, f.o.b. furnace:

No. 2 fdy.	$16.00
No. 2X fdy.	16.50
No. 1 fdy.	17.50
Malleable, sil. up to 2.25	16.50
Basic	14.00
Lake Superior charcoal, del'd.	23.41

CINCINNATI

Per gross ton, delivered Cincinnati:

Ala. fdy., sil. 1.75 to 2.25	$16.51
Ala. fdy., sil. 2.25 to 2.75	16.76
Tenn. fdy., sil. 1.75 to 2.25	16.51
N'th'n No. 2 foundry	$17.01 to 18.19
S'th'n Ohio silvery, 8%	21.39

Freight rates, $1.89 from Ironton and Jackson, Ohio; $3.82 from Birmingham.

CLEVELAND

Per gross ton at Cleveland furnace:

N'th'n No. 2 fdy.	$15.50
Malleable	15.50
Ohio silvery, 8 per cent	23.00
Stand. low. phos., Valley	23.00
Southern No. 2 fdy.	16.14

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates; 63c. average local switching charge; $3.00 from Jackson, Ohio; $6.14 from Birmingham.

PHILADELPHIA

Per gross ton at Philadelphia:

East. Pa. No. 2	$16.34
East. Pa. No. 2X	16.84
East. Pa. No. 1X	17.34
Basic (del'd east Pa.)	16.09
Malleable	16.84
Stand. low phos. (f.o.b. east. Pa. furnace)	$22.00 to $23.00
Cop. b'r'g low phos. (f.o.b. furnace)	22.00 to 23.00
Va. No. 2	21.79
Va. No. 2X	22.29

Prices, except as specified otherwise, are delv'd Philadelphia. Freight rates: 84c. to $1.79 from eastern Pennsylvania furnaces; $4.67 from Virginia furnaces.

BIRMINGHAM

Per gross ton, f.o.b. Birmingham dist. furnace:

No. 2 fdy., 1.75 to 2.25 sil.	$12.00
No. 2 soft, 2.25 to 2.75 sil.	12.50
Basic	12.00

NEW ENGLAND

Per gross ton delivered Boston and nearby New England points:

Buffalo, sil. 1.75 to 2.25	$18.53 to $19.04
Buffalo, sil. 2.25 to 2.75	18.53 to 19.04
Ala., sil. 1.75 to 2.25	18.00 to 18.50

CANADA

Per gross ton:

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75	$22.60
No. 2 fdy., sil. 1.75 to 2.75	22.10
Malleable	22.60

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	$24.00
No. 2 fdy., sil. 1.75 to 2.25	23.50
Malleable	24.00
Basic	$23.00 to 23.50

Ferromanganese

	Per Gross Ton
Domestic, 80%, seaboard	$68.00 to $72.00
Foreign, 80%, Atlantic or Gulf port, duty paid	68.00

The lower price applies to contracts for delivery to June 30, for spot shipment the price is $72.

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$24.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50% (carloads)	$74.50
50% (less carloads)	82.00
75% (carloads)	120.00
75% (less carloads)	130.00
14% to 16% (f.o.b.) Welland, Ont. (in carloads)	31.00
14% to 16% (less carloads)	36.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		Per Gross Ton	
10%	$21.50	14%	$23.50
11%	22.00	15%	24.00
12%	22.50	16%	24.50
13%	23.00		

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

Per Gross Ton		Per Gross Ton	
6%	$19.00	12%	$22.00
7%	19.50	13%	22.50
8%	20.00	14%	23.00
9%	20.50	15%	23.50
10%	21.00	16%	24.00
11%	21.50		

Other Ferroalloys

Ferrotungsten, per lb. wo. del., carloads	94c.
Ferrotungsten, less carloads	$1.00
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	9.50c.
Ferrochromium, 2% carbon	16.50c. to 17.00c.
Ferrochromium, 1% carbon	17.50c. to 18.00c.
Ferrochromium, 0.10% carbon	19.50c. to 20.00c.
Ferrochromium, 0.06% carbon	20.00c. to 20.50c.
Ferrovanadium, del., per lb. contained Va.	$2.60 to 2.80
Ferrocarbontitanium, 15 to 18%, per net ton, f.o.b. furnace in carloads	160.00
Ferrophosphorus, electric, or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton with $2 unitage	50.00
Ferrophosphorus, electric, 24% f.o.b. Anniston, Ala., per gross ton with $2.75 unitage	65.00
Ferromolybdenum, per lb. Mo., del.	95c.
Calcium molybdate, per lb. Mo., del.	80c.
Silico spiegel, per ton, f.o.b. furnace, car lots	$36.00
Ton lots or less, per ton	41.00
Silico-manganese, gross ton, delivered:	
2.50% carbon grade	85.00
2% carbon grade	90.00
1% carbon grade	100.00
Spot prices	$5 a ton higher

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range Bessemer, 51.5% iron	$4.80
Old range, non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorous, 51.50% iron	4.40

Foreign Ore, c.i.f. Philadelphia or Baltimore

	Per Unit
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algerian	7.50c.
Iron, low phos., Swedish, average 68½% iron	8c.
Iron, basic or foundry, Swedish, average, 65% iron	7.50c.
Iron, basic or foundry, Russian, aver. 63% iron (nom.)	7.50c.
Manganese, Caucasian, washed 52%	18c.
Manganese, African, Indian, 50-52%	18c.
Manganese, Brazilian, 46 to 48%	16c.

	Per Net Ton Unit
Tungsten, Chinese wolframite, duty paid	$10.00

	Per Gross Ton
Tungsten, domestic scheelite	$8.00 to $10.00
Chrome, 45%, Cr_2O_3, crude, c.l.f. Atlantic Seaboard	16.00
Chrome, 48%, Cr_2O_3, c.l.f. Atlantic seaboard	18.00

*Quotations nominal in absence of sales.

Fluorspar

	Per Net Ton
Domestic, washed gravel, 85-5 f.o.b. Kentucky and Illinois mines	$10.50 to $11.50
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	13.50
Foreign, 85% calcium fluoride, not over 5% silicon, c.l.f. Atlantic port, duty paid	16.75
Domestic, No. 1 ground bulk, 85 to 98% calcium, fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	30.00

Iron and Steel Scrap

PITTSBURGH

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$11.50 to $12.00
No. 2 heavy melting steel	10.25 to 10.75
No. 2 railroad wrought	11.50 to 12.00
Scrap rails	11.50 to 12.00
Rails 3 ft. and under	12.50 to 13.00
Sheet bar crops, ordinary	12.00 to 12.50
Compressed sheet steel	11.50 to 12.00
Hand bundled sheet steel	10.00 to 10.50
Hvy. steel axle turnings	9.50 to 10.00
Machine shop turnings	8.25 to 8.75
Short shov. steel turnings	8.25 to 8.75
Short mixed borings and turnings	8.00 to 8.50
Cast iron borings	8.00 to 8.50
Cast iron carwheels	11.50 to 12.00
Heavy breakable cast	9.00 to 9.50
No. 1 cast	10.00 to 11.00
Railr. knuckles and couplers	13.00 to 14.00
Rail, coil and leaf springs	13.00 to 14.00
Rolled steel wheels	13.00 to 14.00
Low phos. billet crops	14.00 to 14.50
Low phos. sheet bar crops	13.50 to 14.00
Low phos. plate scrap	13.50 to 14.00
Low phos. punchings	13.50 to 14.00
Steel car axles	13.00 to 13.50

CHICAGO

Delivered Chicago district consumers:

	Per Gross Ton
Heavy melting steel	$8.50 to $9.00
Shoveling steel	8.50 to 9.00
Hydraulic comp. sheets	$7.00 to $7.50
Drop forge flashings	6.25 to 6.75
No. 1 busheling	7.00 to 7.50
Rolled carwheels	9.50 to 10.00
Railroad tires	9.50 to 10.00
Railroad leaf springs	9.50 to 10.00
Axle turnings	7.00 to 7.50
Steel couplers and knuckles	9.50 to 10.00
Coil springs	10.00 to 10.50
Axle turnings (elec. fur.)	8.00 to 8.50
Low phos. punchings	9.50 to 10.00
Low phos. plates, 12 in. and under	9.50 to 10.00
Cast iron borings	5.00 to 5.50
Short shoveling turnings	5.00 to 5.50
Machine shop turnings	5.50 to 6.00
Rerolling rails	9.50 to 10.00
Steel rails, less than 3 ft.	9.50 to 10.00
Steel rails, less than 2 ft.	10.00 to 10.50
Angle bars, steel	9.50 to 10.00
Cast iron carwheels	9.50 to 10.00
Railroad malleable	9.75 to 10.25
Agricultural malleable	7.50 to 8.00

Per Net Ton

Iron car axles	$12.00 to $12.50
Steel car axles	10.50 to 11.00
No. 1 railroad wrought	7.00 to 7.50
No. 2 railroad wrought	7.50 to 8.00

No. 2 busheling	$4.00 to	$4.50
Locomotive tires, smooth	7.50 to	8.50
Pipe and flues	1.25 to	1.75
No. 1 machinery cast	8.75 to	9.25
Clean automobile cast	8.75 to	9.25
No. 1 railroad cast	8.50 to	9.00
No. 1 agricultural cast	8.00 to	8.50
Stove plate	7.00 to	7.50
Grate bars	6.75 to	7.25
Brake shoes	8.00 to	8.50

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

PHILADELPHIA

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$9.00 to	$9.50
No. 2 heavy melting steel	8.00 to	8.50
No. 1 railroad wrought	....	11.00
Bundled sheets	4.00 to	4.50
Hydraulic compressed, new	....	6.00
Hydraulic compressed, old	....	5.00
Machine shop turnings	5.00 to	5.50
Heavy axle turnings	7.50 to	8.00
Cast borings	3.50 to	3.75
Heavy breakable cast	....	9.50
Stove plate (steel works)	7.00 to	7.50
No. 1 low phos. heavy	11.00 to	11.50
Couplers and knuckles	10.00 to	10.50
Rolled steel wheels	10.00 to	10.50
No. 1 blast furnace	....	4.50
Spec. iron and steel pipe	....	8.00
Shafting	13.00 to	13.50
Steel Axles	13.00 to	13.50
No. 1 forge fire	8.00 to	8.50
Cast iron carwheels	10.00 to	10.50
No. 1 cast	10.00 to	10.50
Cast borings (chem.)	10.00 to	10.50
Steel rails for rolling	9.50 to	10.00

CLEVELAND

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$9.00 to	$9.50
No. 2 heavy melting steel	8.50 to	9.00
Compressed sheet steel	9.00 to	9.50
Light bundled sheet stampings	6.50 to	7.00
Drop forge flashings	8.00 to	8.50
Machine shop turnings	5.75 to	6.00
Short shoveling turnings	6.75 to	7.25
No. 1 busheling	7.50 to	8.00
Steel axle turnings	7.50 to	8.00
Low phos., billet crops	12.00 to	12.50
Cast iron borings	6.25 to	6.75
Mixed borings and short turnings	6.25 to	6.75
No. 2 busheling	6.00 to	6.50
No. 1 cast	10.00 to	10.50
Railroad grate bars	5.50 to	6.00
Stove plate	5.50 to	6.00
Rails under 3 ft.	8.50 to	9.00
Rails for rolling	10.00 to	10.50
Railroad malleable	10.00 to	10.50
Cast iron carwheels	....	11.00

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:

No. 1 heavy melting steel	$9.50 to	$10.00
No. 2 heavy melting scrap	8.50 to	9.00
Scrap rails	8.00 to	8.50
New hydraul. comp. sheets	8.50 to	9.00
Old hydraul. comp. sheets	7.50 to	8.00
Drop forge flashings	8.00 to	8.50
No. 1 busheling	8.50 to	9.00
Hvy. steel axle turnings	6.50 to	7.00
Machine shop turnings	5.50 to	6.00
Knuckles and couplers	10.00 to	10.50
Coil and leaf springs	10.00 to	10.50
Rolled steel wheels	10.00 to	10.50
Low phos. billet crops	12.00 to	12.50
Short shov. steel turnings	6.50 to	7.00
Short mixed borings and turnings	6.00 to	6.50
Cast iron borings	6.00 to	6.50
No. 2 busheling	5.00 to	5.50
Steel car axles	11.00 to	12.00
Iron axles	11.00 to	12.00
No. 1 machinery cast	10.50 to	11.00
No. 1 cupola cast	9.50 to	10.00
Stove plate	8.00 to	8.50
Steel rails, 3 ft. and under	11.50 to	12.00
Cast iron carwheels	9.00 to	9.50
Industrial malleable	9.50 to	10.00
Railroad malleable	11.00 to	11.50
Chemical borings	7.50 to	8.00

BIRMINGHAM

Per gross ton delivered consumers' yards:

Heavy melting steel	....	$9.00
Scrap steel rails	....	8.50
Short shoveling turnings	....	4.00
Stove plate	6.50 to	7.00
Steel axles	10.00 to	11.00
Iron axles	10.50 to	11.00
No. 1 railroad wrought	....	5.00
Rails for rolling	9.00 to	9.50
No. 1 cast	....	9.00
Tramcar wheels	8.50 to	9.00
Cast iron borings, chem.	....	8.00

ST. LOUIS

Per gross ton delivered consumers' yards:

Selected heavy steel	$8.00 to	$8.50
No. 1 heavy melting	8.00 to	8.50
No. 2 heavy melting	7.50 to	8.00
No. 1 locomotive tires	6.00 to	6.50
Misc. stand.-sec. rails	8.50 to	9.00
Railroad Springs	9.00 to	9.50
Bundled sheets	3.50 to	4.00
No. 2 railroad wrought	8.00 to	8.50
No. 1 busheling	3.50 to	4.00
Cast iron borings and shoveling turnings	2.50 to	3.00
Rails for rolling	9.50 to	10.00
Machine shop turnings	2.50 to	3.00
Heavy turnings	4.00 to	4.50
Steel car axles	9.50 to	10.00
Iron car axles	11.00 to	11.50
Wrot. iron bars and trans.	7.00 to	7.50
No. 1 railroad wrought	5.50 to	6.00
Steel rails less than 3 ft.	10.00 to	10.50
Steel angle bars	9.00 to	9.50
Cast iron carwheels	8.00 to	8.50
No. 1 machinery cast	8.00 to	8.50
Railroad malleable	8.00 to	8.50
No. 1 railroad cast	8.00 to	8.50
Stove plate	7.00 to	7.50
Relay. rails, 60 lb. and under	16.00 to	16.50
Relay. rails, 60 lb. and over	$20.00 to	$21.00
Agricult. malleable	4.00 to	4.50

BOSTON

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$5.00 to	$5.25
Scrap T rails	4.75 to	5.00
Machine shop turnings	2.00 to	2.25
Cast iron borings	2.00 to	2.25
Bundled skeleton, long	3.00 to	3.25
Forge flashings	3.00 to	3.25
Blast furnace scrap	1.75 to	2.00
Shafting	7.50 to	8.00
Steel car axles	8.00 to	8.50
Wrought pipe	2.25 to	2.50
Rails for rerolling	6.00 to	6.50
Cast iron borings, chemical	7.25 to	7.75

Per gross ton delivered consumers' yards:

Textile cast	$7.00 to	$7.50
No. 1 machinery cast	7.00 to	7.50
Stove plate	4.25 to	4.50
Railroad malleable	8.50 to	9.50

NEW YORK

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$5.50 to	$6.00
No. 2 heavy melting steel	4.50 to	5.00
Heavy melting steel (yard)	2.50 to	3.00
No. 1 heavy breakable cast	5.00 to	5.50
Stove plate (steel works)	3.25 to	3.50
Machine shop turnings	2.50 to	3.00
Short shoveling turnings	2.50 to	3.00
Cast borings	2.50 to	3.00
No. 1 blast furnace	2.50 to	3.00
Steel car axles	9.50 to	10.00
Spec. iron and steel pipe	....	$3.50
Forge fire	....	4.25
No. 1 railroad wrought	$5.00 to	5.50
No. 1 yard wrought long	3.50 to	3.75
Rails for rolling	5.50 to	6.00
No. 1 cast	5.50 to	5.75
No. 2 cast	4.50 to	4.75
Stove plate (foundry)	4.50 to	5.00
Cast borings (chemical)	6.00 to	6.50

Per gross ton, delivered local foundries:

No. 1 machinery cast		$9.00
No. 1 hvy. cast (cupola size)	7.50 to	8.00
No. 2 cast	5.00 to	5.50

CINCINNATI

Dealers' buying prices per gross ton:

Heavy melting steel	$7.25 to	$7.75
Scrap rails for melting	7.25 to	7.75
Loose sheet clippings	2.50 to	3.00
Bundled sheets	4.25 to	4.75
Cast iron borings	3.50 to	4.00
Machine shop turnings	3.25 to	3.75
No. 1 busheling	4.50 to	5.00
No. 2 busheling	2.75 to	3.25
Rails for rolling	7.75 to	8.25
No. 1 locomotive tires	7.25 to	7.75
Short rails	10.00 to	10.50
Cast iron carwheels	7.25 to	7.75
No. 1 machinery cast	6.75 to	7.25
No. 1 railroad cast	6.25 to	6.75
Burnt cast	4.50 to	5.00
Stove plate	4.50 to	5.00
Agricultural malleable	7.75 to	8.25
Railroad malleable	8.00 to	8.50

DETROIT

Dealers' buying prices per gross ton:

Hvy. melting steel	$7.50 to	$8.00
Borings and short turnings	5.50 to	6.00
Long turnings	4.50 to	5.00
No. 1 machinery cast	8.00 to	8.50
Automotive cast	10.00 to	10.50
Hydraul. comp. sheets	7.50 to	8.00
Stove plate	4.50 to	5.00
New No. 1 busheling	6.50 to	7.00
Old No. 2 busheling	4.50 to	5.00
Sheet clippings	4.25 to	4.75
Flashings	5.50 to	6.00

CANADA

Dealers' buying prices per gross ton:

	Toronto	Montreal
Heavy melting steel	$4.50	$4.50
Rails, scrap	4.50	4.50
Machine shop turnings	2.00	2.00
Boiler plate	4.50	4.50
Heavy axle turnings	2.50	2.50
Cast borings	2.00	2.00
Steel borings	2.00	2.00
Wrought pipe	2.50	2.50
Steel axles	4.50	6.00
Axles, wrought iron	4.50	6.50
No. 1 machinery cast	7.75	9.00
Stove plate	4.50	5.00
Standard carwheels	7.25	7.00
Malleable	6.75	7.00

Warehouse Prices for Steel Products

PITTSBURGH

	Base per Lb.
Plates	2.85c.
Structural shapes	2.85c.
Soft steel bars and small shapes	2.60c.
Reinforcing steel bars	2.60c.
Cold-finished and screw stock—	
Rounds and hexagons	2.95c.
Squares and flats	2.95c.
Hoops and bands, under ¼ in.	2.95c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.10c.
Galv. sheets (No. 24), 25 or more bundles	3.60c.
Hot-rolled sheets (No. 10) 2.60c. to	2.90c.
Galv. corrug. sheets (No. 28), per square (less than 3750 lb.)	$3.61
Spikes, large	2.40c.
Small	2.65c.
Boat	2.90c.
Track bolts, all sizes, per 100 count,	70 per cent off list.
Machine bolts, 100 count,	70 per cent off list.
Carriage bolts, 100 count,	70 per cent off list.
Nuts, all styles, 100 count,	70 per cent off list.
Large rivets, base per 100 lb.	$3.00
Wire, black, soft ann'l'd, base per 100 lb.	2.65
Wire, galv. soft, base per 100 lb.	3.10
Common wire nails, per keg	2.20
Cement coated nails, per kg.	2.20

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 999 lb.

CHICAGO

	Base per Lb.
Plates and structural shapes	3.00c.
Soft steel bars	2.75c.
Reinforc. bars, billet steel	1.75c. to 1.90c.
Rail steel reinforcement	1.50c. to 1.65c.
Cold-fin. steel bars and shafting	
Rounds and hexagons	3.00c.
Flats and squares	3.50c.
Bands, 3/16 in. (in Nos. 10 and 12 gages)	2.95c.
Hoops (No. 14 gage and lighter)	3.50c.
Hot-rolled annealed sheets (No. 24)	3.45c.
Galv. sheets (No. 24)	3.85c.
Hot-rolled sheets (No. 10)	2.75c.
Spikes (3/16 in. and lighter)	3.45c.
Track bolts	4.30c.
Rivets, structural (keg lots)	2.75c.
Rivets, boiler (keg lots)	2.75c.
	Per Cent Off List
Machine bolts	65
Carriage bolts	65
Coach and lag screws	65
Hot-pressed nuts, sq., tap. or blank.	65
Hot-pressed nuts, hex., tap. or blank.	65
Hex. head cap screws	80 and 10
Cup point set screws	75
Flat head bright wood screws	50 and 10
Spring cotters	60 and 10
Stove bolts	80
Rd. hd. tank rivets, 7/16 in. and smaller	65
Wrought washers	$4.50 off list
No. 8 black ann'l'd wire, per 100 lb.	$3.45
Com. wire nails, base per keg	2.30
Cement c't'd nails, base per keg	2.30

NEW YORK

	Base per lb.
Plates and struc. shapes	3.10c.
Soft steel bars, small shapes	3.10c.
Iron bars	3.24c.
Iron bars, swed. charcoal	5.75c. to 6.25c.
Cold-fin. shafting and screw stock:	
Rounds and hexagons	3.54c.
Flats and squares	4.04c.
Cold-roll. strip, soft and quarter hard	4.95c.
Hoops	3.30c.
Bands	3.30c.
Hot-rolled sheets (No. 10)	2.60c.
Hot-rolled ann'l'd sheets (No. 24*)	3.25c.
Galvanized sheets (No. 24*)	3.50c.
Long terne sheets (No. 24)	4.50c.
Standard tool steel	12.00c.
Wire, black annealed (No. 10)	3.60c.
Wire, galv. annealed (No. 10)	4.05c.
Tire steel ½ x ¼ in. and larger	3.40c.
Smooth finish, 1 to 2½ x ¼ in. and larger	3.75c.
Open hearth spring steel, bases	4.50c. to 7.00c.
Common wire nails, base, per keg	$2.65
	Per Cent
Machine bolt, cut thread:	Off List
¾ x 6 in. and smaller	65 to 65 and 10
1 x 30 in. and smaller	65 to 65 and 10
Carriage bolts, cut thread:	
½ x 6 in. and smaller	65 to 65 and 10
¾ x 20 in. and smaller	65 to 65 and 10
Boiler tubes:	Per 100 Ft.
Lap welded, 2-in.	$18.05
Seamless welded, 2-in.	19.24
Charcoal iron, 2-in.	24.94
Charcoal iron, 4-in.	63.65

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

ST. LOUIS

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.00c.
Cold-fin. rounds, shafting, screw stock	3.36c.
Hot-rolled annealed sheets (No. 24)	3.60c.
Galv. sheets (No. 24)	4.00c.
Hot-rolled sheets (No. 10)	3.00c.
Black corrug. sheets (No. 24)	3.65c.
Galv. corrug. sheets	4.05c.
Structural rivets	3.00c.
Boiler rivets	3.00c.
	Per Cent Off List
Tank rivets, 7/16 in. and smaller, 100 lb. or more	70
Less than 100 lb.	70
Machine bolts	65
Carriage bolts	65
Lag screws	65
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more	65
Less than 200 lb.	55
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	65
Less than 200 lb.	55

PHILADELPHIA

	Base per Lb.
*Plates, ¼-in. and heavier	2.45c.
*Structural shapes	2.45c.
*Soft steel bars, small shapes, iron bars (except bands)	2.45c.
Reinforc. steel bars, sq., twisted and deform.	2.30c.
Cold-finished steel bars	3.35c.
*Steel hoops	3.00c.
*Steel bands, No. 12 to 3/16 in., incl.	2.75c.
Spring steel	5.00c.
†Hot-rolled annealed sheets (No. 24)	3.15c.
†Galvanized sheets (No. 24)	3.50c.
*Hot-rolled annealed sheets (No. 10)	2.70c.
Diam. pat. floor plates, ¼ in.	5.00c.
Swedish iron bars	5.60c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

*Base prices subject to deductions on orders aggregating 4000 lb. or over.

†For 50 bundles or over.

CLEVELAND

	Base per Lb.
Plates and struc. shapes	2.95c.
Soft steel bars	2.75c.
Reinforc. steel bars	1.75c. to 2.35c.
Cold-fin. steel bars	2.95c.
Flat rolled steel under ¼ in.	3.00c.
Cold-finished strip	5.55c.
Hot-rolled annealed sheets (No. 24)	3.25c.
Galvanized sheets (No. 24)	3.50c.
Hot-rolled sheets (No. 10)	3.00c.
Black ann'l'd wire, per 100 lb.	$2.55
No. 9 galv. wire, per 100 lb.	2.90
Com. wire nails, base per keg	2.10

* Net base, including boxing and cutting to length.

CINCINNATI

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.00c.
New billet reinforc. bars	3.00c.
Rail steel reinforc. bars	3.00c.
Hoops	3.90c.
Bands	3.20c.
Cold-fin. rounds and hex.	3.32c.
Squares and flats	3.82c.
Hot-rolled annealed sheets (No. 24)	3.75c.
Galv. sheets (No. 24)	4.00c.
Hot-rolled sheets (No. 10)	3.30c.
Structural rivets	4.20c.
Small rivets	.60 per cent off list
No. 9 ann'l'd wire, per 100 lb.	$3.00
Com. wire nails, base per keg (10 to 49 kegs)	2.65
Larger quantities	2.50
Cement c't'd nails, base 100-lb. keg	2.95
Chain, per 100 lb.	10.25
	Net per 100 Ft.
Seamless steel boiler tubes, 2-in.	$15.87
4-in.	34.57
Lap-welded steel boiler tubes, 2-in.	15.12
4-in.	32.96

BUFFALO

	Base per Lb.
Plates and struc. shapes	3.20c.
Soft steel bars	2.95c.
Reinforcing bars	2.95c.
Cold-fin. flats and sq.	3.00c.
Rounds and hex.	3.00c.
Cold-rolled strip steel	5.25c.
Hot-rolled annealed sheets (No. 24)	3.35c.
Galv. sheets (No. 24)	3.75c.
Bands	3.30c.
Hoops	3.55c.
Hot-rolled sheets (No. 10) 48-in. and narrower	3.00c.
Wider than 48-in.	3.25c.
Com. wire nails, base per keg	$2.40
Black wire, base per 100 lb.	3.25

BOSTON

	Per Lb.
*Beams, channels, angles, tees, zees	2.60c.
*H beams and shapes	2.60c.
*Plates—sheared, tank and univ. mill, ¼ in. thick and heavier	2.60c.
*Floor plates, diamond pattern	4.50c.
*Bar and bar shapes (mild steel)	2.50c.
*Bands 3/16 in. thick and No. 12 ga. incl.	3.50c.
Hoops, No. 14 ga. and lighter	4.90c. to 5.40c.
*Half rounds, half ovals, ovals and bevels	3.75c.
Tire steel, rd. edge 1½ x ⅛ in. and larger	4.50c.
Smaller sizes	4.75c.
Cold-finished rounds and hexagons	3.60c.
Cold-rolled strip steel	5.20c.
Cold-finished squares and flats	4.10c.
*Blue annealed sheets, No. 10 ga.	2.45c.
One pass cold-rolled sheets No. 24 ga.	3.50c.
Blued stove pipe sheets, No. 24 ga.	3.90c.
Galvanized steel sheets No. 24 ga.	4.00c.
Lead coated (long ternes) No. 24 ga.	5.00c.
Black wire, base per 100 lb., 2500 lb. or less	3.35c.
Over 2500 lb.	3.25c.

Base prices for 40,000 lb. orders; extras apply for smaller quantities.

PACIFIC COAST

	Base per Lb.		
	San Francisco	Los Angeles	Seattle
Plates, tank and U.M.	2.80c.	3.30c.	3.00c.
Shapes, standard	3.15c.	3.30c.	3.00c.
Wide-flanged beams and columns	3.25c.	3.30c.	3.50c.
Soft steel bars	3.15c.	3.30c.	3.00c.
*Reinforcing bars	3.00c.	3.00c.	3.00c.
Hot-rolled annealed sheets (No. 24)	3.80c.	4.20c.	4.25c.
Hot - rolled sheets (No. 10)	3.18c.	3.80c.	3.50c.
Galv. sheets (No. 24)	4.40c.	4.50c.	4.00c.
*Struc. rivets, ½ in. and larger	5.75c.	6.00c.	5.25c.
*Cold finished steel Rounds	5.50c.	5.50c.	5.50c.
Squares and hexagons	6.75c.	6.75c.	6.75c.
Flats	7.25c.	7.25c.	7.25c.
Common wire nails —base per keg less carload	$2.55	$2.55	$2.65

*Subject to deductions for quantity.

PLANT EXPANSION AND EQUIPMENT BUYING

NEW ENGLAND

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until June 20 for 184 blank steel shells (Schedule 227) for Newport, R. I., Navy Yard.

Metro Oil Burner Mfg. Co., Inc., Easthampton, Mass., has been organized by Antoni Muszynski, Southampton, Mass., and associates, to manufacture oil burners and oil-burning equipment.

W. Starling Burgess, Darien, Conn., is at head of project to manufacture new model automobile, about 75-hp. rating, with chassis mounted on three wheels. Part of former plant of Locomobile Co. of America, Bridgeport, Conn., has been leased, and commercial production will soon begin, including parts manufacture and assembling. Company will be organized to carry out project; Buckminster Fuller will be an official.

Rex Pump Co., Hartford, Conn., has been organized by Norman Yellin, 650 Main Street, and Hazen B. Bennett, 475 New Britain Avenue, to manufacture pumping machinery and parts.

Berkshire-Pequonnock Coal Co., 688 North Washington Avenue, Bridgeport, Conn., plans bulk fuel oil terminal, with steel tanks and other equipment. Cost about $25,000 with equipment.

Remington Arms Co., Bridgeport, Conn., recently acquired by E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., and now operated as a subsidiary, plans expansion, with increased facilities for firearms and allied product manufacture. C. K. Davis is president and general manager.

NORTH ATLANTIC

American Smelting & Refining Co., 120 Broadway, New York, has purchased Grand Central mining properties of Chief Consolidated Mining Co., Tintic district, Utah, and will carry out expansion and development program, with installation of mining, ore-handling and conveying, and other equipment. Property has gold, silver, lead and copper ores, and output will be handled at smelting plant at Garfield, Utah.

Kennedy-Van Saun Mfg. & Engineering Corpn., 2 Park Avenue, New York, manufacturer of mining, crushing, grinding and kindred machinery, is considering new plant unit at Charlotte, N. C. Cost over $100,000 with equipment.

Allen-Billmyre Corpn., New York, has been organized by Joseph F. Billmyre, 489 Lexington Avenue, and James J. Todd, 59 Stuyvesant Avenue, Larchmont, N. Y., to manufacture blowers, exhaust fans and kindred mechanical equipment.

Signal Supply Officer, Army Base, Brooklyn, asks bids until June 23 for projector equipments, drying racks, etc. (Proposal 122); until June 26, 75 racks, 75 frames, 75 covers (Proposal 124); mast and mast base sections, clips, connectors, etc. (Proposal 125).

Loose-Wiles Biscuit Co., Thompson Avenue, Long Island City, with headquarters at Kansas City, Mo., has leased new building to be erected at St. Albans, Queens, L. I., for factory branch, storage and distributing plant. Cost over $45,000 with equipment.

Gulf Refining Co., 17 Battery Place, New York, plans new bulk oil storage and distributing plant at Brunswick, Ga. Cost about $50,000 with tanks and other equipment.

Triplex Oil Refining Co., Review Avenue, Long Island City, has plans for extensions and improvements in oil storage and distributing plant. Cost over $25,000 with equipment.

Ross Galvanizing Works, Brooklyn, has been organized, capital $125,000, by Samuel J. Kupfer, 624 Avenue M, and associates, to manufacture galvanized metal products, roofing, etc. Company will take over organization of same name, 395 Kent Avenue. Same interests have chartered Ross Roofing & Building Supply Corpn. as an affiliated organization.

Anaconda Copper Mining Co., 25 Broadway, New York, has resumed operations at Orphan Girl zinc mining properties, following shutdown since June, 1930, recalling over 300 men. Production schedules will be increased at zinc concentrating plant at Anaconda, Mont., near mines noted, and at zinc refinery at Great Falls, Mont.

Lion Brewery, Columbus Avenue and 108th Street, New York, has asked bids on general contract for extensions and improvements in bottling plant. Cost over $50,000 with equipment. A. A. Tearle, 14 West Forty-fifth Street, is architect; E. H. Schellitzer, Tribune Building, is engineer.

Edward & John Burke, Ltd., 47-24 Twenty-seventh Street, Long Island City, brewer, let general contract to George A. Fuller Co., 597 Madison Avenue, New York, for two new units for bottling, mechanical-cooling, storage and distributing service. Cost about $150,000 with equipment. W. S. Kinnear & Co., 50 Church Street, New York, are engineers.

Board of Public Works, South Amboy, N. J., is considering erection of a municipal electric light and power plant. Cost over $85,000 with equipment.

Parker Mfg. Co., Inc., Irvington, Newark, N. J., has been organized by John Tillisch, Sr., and Jr., 305 Coit Street, to manufacture razor blades, knives, cutlery, etc.

Solondz Brothers, 145 Schley Street, Irvington, Newark, manufacturer of screens and kindred products, has plans for rebuilding two-story plant, recently damaged by fire. Cost over $25,000 with equipment. Victor H. Strombach, 1243 Springfield Avenue, Irvington, is architect.

Woven Steel Hose Co., Dale Street, Trenton, N. J., is developing a capacity schedule, running on 24-hr. day basis, six-day week, with normal working quota.

Kwick Mfg. Co., Elizabeth, N. J., has been organized by Glenn C. Skinner, 417 Verona Avenue, Elizabeth, and Chauncey B. Hansen, Bloomfield, N. J., capital $100,000, to manufacture steel, brass, aluminum and other metal products.

Kuebler Brewery, Easton, Pa., has been acquired by new interests, headed by Harold Van Syckle, 509 Tisdal Place, Woodbridge, N. J., for price of $350,000. Company is being organized under name of Kuebler Brewing Co., to operate property. Plans are under way for expansion and modernization, including new equipment. Cost about $100,000 with machinery.

De La Vergne Engine Co., Eddystone, Pa., manufacturer of stationary engines, parts, etc., affiliated with Baldwin Locomotive Works, same place, has developed new line of air-conditioning machinery, and will operate division for parts production and assembling.

John Maneely Co., D Street and Erie Avenue, Philadelphia, iron piping, pipe fittings, valves, etc., has taken title to seven story factory, 174 x 300 ft., at 926-42 Newark Avenue, Jersey City, N. J., and plans to use in part for branch service.

Lebanon Steel Foundry, Lebanon, Pa., is arranging for early production of a new line of steel specialties, for which rights have been secured from a steel manufacturer in Switzerland. Capacity will be increased.

Danville Art Bronze Works, Danville, Pa., has reopened plant, following shut-down since last July, and will develop capacity schedule at once, with full working quota.

New York State Electric & Gas Corpn., 123 South Cayuga Street, Utica, N. Y., plans electric power distributing plant and transmission lines at Madison, N. Y., and vicinity. Cost about $60,000 with equipment.

Brockway Motor Truck Corpn., Cortland, N. Y., has advanced production to 10-hr. day, full week schedule, with increased working force.

SOUTH ATLANTIC

Industrial Rayon Corpn., West Ninety-eighth Street and Walford Avenue, Cleveland, has authorized installation of machinery in addition to branch mill at Covington, Va., now being completed. Cost about $100,000 with equipment. Christian, Schwarzenberg & Gaede Co., 1836 Euclid Avenue, Cleveland, is architect.

Purchasing Officer, Department of Interior, Washington, asks bids until June 20 for automobile equipment, including skid chains, valve caps, hub caps, cross chains, jacks, valve cores, hoe clamps, coil units, carbon scrapers, gaskets, etc. (Schedule 22); steel barrels, fire extinguishers, receptacle plates, plugs and other electrical supplies (Schedule 22 A).

Virginia-Carolina Chemical Corpn., Richmond, Va., manufacturer of industrial chemicals, etc., plans rebuilding part of branch plant at Charlotte, N. C., recently destroyed by fire. Loss over $75,000 with equipment.

General Purchasing Officer, Panama Canal, Washington, asks bids until June 23 for nuts, bolts, washers, pipe fittings, rivets, steel tubing, machine bolt expansion shields, valves, cocks, storage batteries, aluminum sheets, etc. (Schedule 2877).

Tubize Chatillon Corpn., Hopewell, Va., manufacturer of cellulose rayon products, has begun superstructure for one-story mill unit. General contract was recently let to Capitol Construction Co., 62 Bartow Street, N. W., Atlanta, Ga. Cost about $50,000 with equipment.

Board of District Commissioners, District Building, Washington, asks bids until June 20 for about 54,679 lb. furnace castings and fittings for district repair shop.

Southern Breweries, Inc., Charlotte, N. C., has purchased local site and will have plans drawn for new plant, consisting of several units with refrigerating and bottling departments, steam power house, etc. Cost over $125,000 with equipment. E. A. Mees, Mees & Mees, Court Arcade, is engineer.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until June 20 for punches (Schedule 199) for Brooklyn and Mare Island Navy Yards; rivet and bar steel, medium and high tensile (Schedule 195) for Philadelphia, Portsmouth, San Diego and Puget Sound yards; grating and ladder treads (Schedule 237) for Brooklyn, Philadelphia, Mare Island and Puget Sound yards; storage batteries (Schedule 238) for Brooklyn and Mare Island yards; countersinks and reamers (Schedule 213), copper sheets (Schedule 233), steel plates (Schedule 208), welding electrodes and rods (Schedule 209), copper-nickel alloy (Schedule 212), wrenches (Schedule 203) all for Eastern and Western yards; soot blower units and spare parts (Schedule 235) for Boston, Brooklyn, Philadelphia and Puget Sound yards.

CENTRAL DISTRICT

Dravo Contracting Co., Neville Island, Pittsburgh, manufacturer of steel barges and other steel marine equipment, has plans for two one-story additions about 75 x 125 ft. Cost over $40,000 with equipment.

Oil Well Supply Co., Clark Building, Pittsburgh, manufacturer of oil well machinery, pumping equipment, parts, etc., is planning to double operations at Imperial Works, Oil City, Pa., with additions to working force. Company will carry out expansion and improvement program in rod division of same plant, to cost over $50,000 with equipment.

Clepper & Clepper, McDowell Bank Building, Sharon, Pa., architects, have plans for new local brewery for company now being organized. It will consist of several units, with bottling, mechanical-cooling, storage and distributing departments. Cost over $450,000 with machinery.

Akron Brewing Co., South Forge and Hill Streets, Akron, Ohio, will take bids soon for extensions and improvements. New equipment will be installed. Cost over $75,000 with machinery. Wilbur Watson & Associates, 4614 Prospect Avenue, and E. A. Broberg, 2014 West Fifty-third Street, both Cleveland, are architects and associate architect, respectively.

Francisco Auto Heater Mfg. Co., Columbus, Ohio, has been organized by Charles M. Francisco and associates, to manufacture automobile heaters, parts, and kindred equipment. Company will take over organization of same name, with plant at Cleveland and Essex Avenues.

Dayton Rubber Mfg. Co., 2345 West Riverview Avenue, Dayton, Ohio, manufacturer of automobile tires and kindred rubber products, has plans for one-story L-shaped addition, 40 x 200 ft. and 40 x 100 ft., for storage and distribution. Cost about $35,000 with equipment. Geyer & Neuffer, Ludlow Arcade Building, are architects.

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Plants: Chicago, Illinois, and New Castle, Indiana

Sieberling Rubber Co., Akron, Ohio, manufacturer of automobile tires and tubes, etc., has adopted maximum production schedule, 24-hr. day, seven-day week, with full working force.

East Side Iron Elevator Co., National Bank Building, Toledo, Ohio, is considering erection of new grain elevator. Cost over $225,000 with elevating, conveying, screening and other equipment.

Barberton Match Works, Barberton, Ohio, has let general contract to William Barnard, Barberton, for addition to plant, including improvements in present unit and expansion of power house. Cost about $35,000 with equipment.

Commercial Shearing & Stamping Co., Youngstown, Ohio, manufacturer of hydraulic hoists, steel automobile bodies, etc., has adopted 24-hr. day schedule, divided into three 8-hr. shifts, with full working force.

Village Council, Eaton, Ohio, has surveys under way for a municipal electric light and power distributing system. Cost close to $100,000 with equipment. Burns & McDonnell Engineering Co., Interstate Building, Kansas City, Mo., is consulting engineer.

Central States Bridge Co., 601 Beecher Street, Indianapolis, will soon begin rebuilding one-story structural steel fabricating works, recently destroyed by fire. Cost close to $30,000 with equipment. Edward Messick is president.

Truck & Trailer of Indiana, Inc., Elkhart, Ind., has been organized by Harry A. Lund and Lewis R. Arnold, Elkhart, to manufacture automobile trucks and trailers, parts, etc.

Emge Packing Co., Fort Branch, Ind., Oscar Emge, manager, meat packer, will take bids soon on general contract for addition, including one-story power house. Cost about $100,000 with equipment. H. Peter Henschien, 24 East Van Buren Street, Chicago, is architect and engineer.

Cadillac Soo Lumber Co., Sault Ste. Marie, Mich., is planning to rebuild distilling plant unit recently destroyed by fire. Loss about $70,000 with tanks and other equipment.

Forging Co. of Detroit, Inc., Detroit, has been organized by Benjamin B. Jacob, 1109 Guaranty Trust Building, and associates, capital $250,000, to manufacture steel forgings and castings, and operate a general machine and mechanical works.

Chrysler Corpn., 341 Massachusetts Avenue, Detroit, has asked bids on general contract for one-story addition, 130 x 250 ft., for storage and distribution. Cost over $75,000 with equipment. C. C. Williams is in charge.

Mueller Metals Co., Port Huron, Mich., manufacturer of copper and brass products, is advancing production and adding to working force. Plant is now giving employment to about 600 men.

Walker Products Co., Center Line, Detroit, has awarded general contract to Misch Brothers, Inc., 3001 Gratiot Street, for one-story addition to brewery. Cost about $75,000 with equipment.

Viking Mfg. Co., Jackson, Mich., has been organized by John A. Erickson, 324 Otsego Avenue, and associates, capital $50,000, to manufacture machinery and parts.

MIDDLE WEST

General Machinery & Mfg. Co., 215 Aberdeen Street, Chicago, manufacturer of steel hardware, steel furniture specialties, etc., has taken title to one-story building at 2634 North Keeler Avenue, Healy Industrial District, totaling 10,000 sq. ft. floor space, for main plant and will expand capacity.

Purchasing Officer, Department of Interior, United States Indian Warehouse, 1749 West Pershing Road, Chicago, asks bids until June 20 for axes, saw blades, blacksmith's blowers, stove bolts, spring calipers, bolt clippers, carriage-maker's clamps, drills, files, tool grinders, anvils, augers, blacksmith's chisels, bar iron, sheet iron, log chains, tools, vises, tool steel, iron and steel wire, reamers, valves, wire cloth, taps, stocks and dies, pipe and pipe fittings, plumbing tools, animal shoes, scales and other equipment, covering requirements for next fiscal year (Schedule 17).

Titan Auto Lock, Inc., 2356 Ashland Avenue, Evanston, Ill., has been organized by Harold D. and George B. Mulloy, Evanston, to manufacture locks and locking devices for automobiles.

Interstate Brewing Co., 418 Court Street, Sioux City, Iowa, B. E. Short, president, now being reorganized, is planning expansion and modernization at brewery, including equipment. Cost about $150,000.

Heiberg Brewing Co., Waverly, Iowa, is considering extensions and improvements, including new one-story addition. Cost about $80,000 with equipment.

Grunow Corpn., 307 North Michigan Avenue, Chicago, manufacturer of electric refrigerators and parts, has merged with United States Radio & Television Corpn., Marion, Ind., manufacturer of radio broadcasting and television equipment. Consolidated organization will carry out expansion. J. Clark Coit, president of United States company, will be chairman of board, and William C. Grunow, president.

International Harvester Co., 606 South Michigan Avenue, Chicago, let general contract to Tunnicliff Construction Co., 1225 West Second Street, Davenport, Iowa, for one-story addition to plant at Moline, Ill., 165 x 500 ft. Cost over $150,000 with equipment.

Dick Brothers Brewing Co., Quincy, Ill., has begun expansion and improvement program, to include equipment to double present capacity. Cost over $80,000 with machinery.

E. G. Staude Mfg. Co., 2675 University Avenue, St. Paul, manufacturer of paper box-making machinery, tractor equipment, etc., plans rebuilding part of plant recently damaged by fire. Loss about $30,000 with equipment.

Hamilton Steel Products Co., Inc., Room 2500, 1 North La Salle Street, Chicago, has been organized by E. J. Platt and others, to manufacture steel toys and other steel specialties.

Universal Tool & Die Co., Milwaukee, has leased its plant to Western Rawhide & Belting Co., and is transferring equipment to works of its parent company, Wrought Washer Mfg. Co., at 2100 South Bay Street, Milwaukee. Charles H. Disch is president.

Ladish-Stoppenbach Co., 4219 West National Avenue, Milwaukee, has placed general contract with Klug & Smith Co., 111 East Wisconsin Avenue, for building two-story malt plant extension, 30 x 150 ft., and new kiln building, 30 x 95 ft., 70 ft. high, at its Jefferson, Wis., plant. Charles A. Cahill, Jr., is consulting engineer on machinery, perforated steel floors, tanks, etc.

Merrill Mfg. Corpn., Merrill, Wis., has been incorporated by W. J. Tesch, F. E. Taylor and Paul Gebert, Sr., to manufacture bright wire goods, metal stampings, dies, etc.

SOUTH CENTRAL

Louisiana Frog Co., Rayne, La., L. H. Baer, head, manufacturer of frogs, crossings and other track materials, has plans for one-story unit, 40 x 80 ft.

City Council, Florence, Ala., has called special election June 30 to approve bonds for $300,000, fund to be used for a municipal electric light and power plant and distributing system.

City Council, Bowling Green, Ky., plans installation of pumping machinery and other equipment for extensions and improvements in sewage system. Fund of $70,000 has been arranged for work.

Dixie Oil Refining Co., Jackson, Miss., recently organized by Charles Wright, Jackson, and associates, has acquired waterfront site for new oil refinery and will begin work soon on initial unit. Installation will include division for gasoline production. A one-story boiler plant and pumping station will be built. Cost close to $100,000 with equipment.

Chess & Wymond Co., 421 West Avery Street, Louisville, manufacturer of wire-bound kegs, barrels, etc., plans expansion and modernization, including complete electrification of plant. Additional machinery will be installed. Cost over $60,000 with equipment.

Dixie Brewing Co., 2401 Tulane Avenue, New Orleans, let general contract to L. F. Favret, 937 Gravier Street, for one-story top addition, 60 x 75 ft., for storage and distribution. Cost about $25,000 with equipment.

SOUTHWEST

Gasconade River Power Co., Kansas City, Mo., care of D. A. Dean, 605 R. A. Long Building, consulting engineer, plans early hearing on application for hydroelectric generating plant on Gasconade River, near Rolla, Mo. Project will include power dam, 1840 ft. long and 130 ft. high. Generating plant will have initial capacity of 60,000 hp. A transmission line will be built. Entire development to cost over $10,000,000. R. W. Street is president.

Griesedieck Brothers Brewery Co., Nineteenth Street and Shenandoah Avenue, St. Louis, has plans for extensions, including enlargements in boiler plant and additional equipment. Cost close to $45,000 with machinery. Baumes-McDevitt Co., Railway Exchange Building, is engineer.

Sieloff Packing Co., 4320 Sacramento Street, St. Louis, meat packer, has let general contract to H. Kissel's Sons Co., 4107 West Florissant Street, for two-story and basement addition, 70 x 80 ft. Cost $60,000 with equipment. Wedemeyer & Nelson, Wainwright Building, are architects.

H. T. Farrell, Plano, Tex., and associates have engaged James W. Williams, 610 Newell Avenue, Dallas, Tex., consulting engineer, to prepare plans for washed sand and gravel plant on 500-acre tract on Trinity River, near Dallas. Installation will include power house, machine shop, mechanical-washing plant, storage and distributing plant, with loading, conveying and other mechanical-handling equipment. Cost over $150,000 with machinery.

PACIFIC COAST

Commonwealth Consolidated Gas, Ltd., 1009 West Seventh Street, Los Angeles, is considering new plant for production of carbon black near Hanford, Cal., utilizing natural gas from Dudley Ridge fields. Cost over $400,000 with compressors, tanks, pipe lines and other equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until June 20 for 21,600 ft. phosphor bronze wire rope (Schedule 232) for Mare Island Navy Yard; 27,600 lb. admiralty metal condenser tubing (Schedule 217), 7500 lb. rolled manganese nickel (Schedule 210), 36 brass tube sheets (Schedule 218), for Puget Sound yard.

Ritz Brewing Co., San Diego, Cal., Baron Long, president, recently organized by Mr. Long and associates, has leased property on Imperial Avenue, and will remodel for new brewery. A portion of equipment will be removed from plant of Wise Brewing Co., Nogales, Sonora, Mexico, acquired by company, and additional machinery purchased. Cost over $100,000 with equipment.

Lindsay Farm Bureau Fruit Association, Lindsay, Cal., is planning to rebuild fruit packing and distributing plant recently destroyed by fire. Loss over $100,000 with machinery.

American Sheet Metal Works, Los Angeles, has been organized by William F. and Henry J. Pahland, Los Angeles, to manufacture sheet metal products. Company will take over organization of same name, with plant at 5811 North Figueroa Street.

Constructing Quartermaster, Rockwell Field, Cal., asks bids until June 26 for construction of an electric distributing system.

Reis Mining Co., Newport, Wash., is planning new concentrating mill at Eagle gold mining property, near city. Electric-operated equipment will be installed and power transmission line built to mill. Cost over $70,000 with machinery. A. C. Niernan is manager at property.

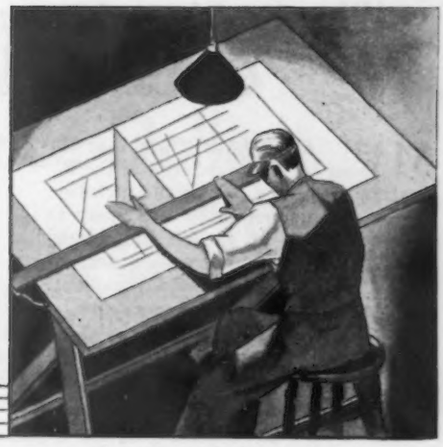
Los Angeles Brewing Co., 1920 North Main Street, Los Angeles, let general contract to John A. Klarquist, 618 South Western Avenue, for one-story addition, 48 x 133 ft., with four-story tower, 16 x 16 ft., to be used in part for storage and distribution. Cost about $50,000 with equipment. Llewellyn A. Parker, Architects Building, is architect.

FOREIGN

British Broadcasting Corpn., London, England, has acquired site near Droitwich for new superpower radio broadcasting station, to include steel towers, generating plant and other structures. It is expected to be ready for service in about 12 months. Cost over $400,000 with equipment.

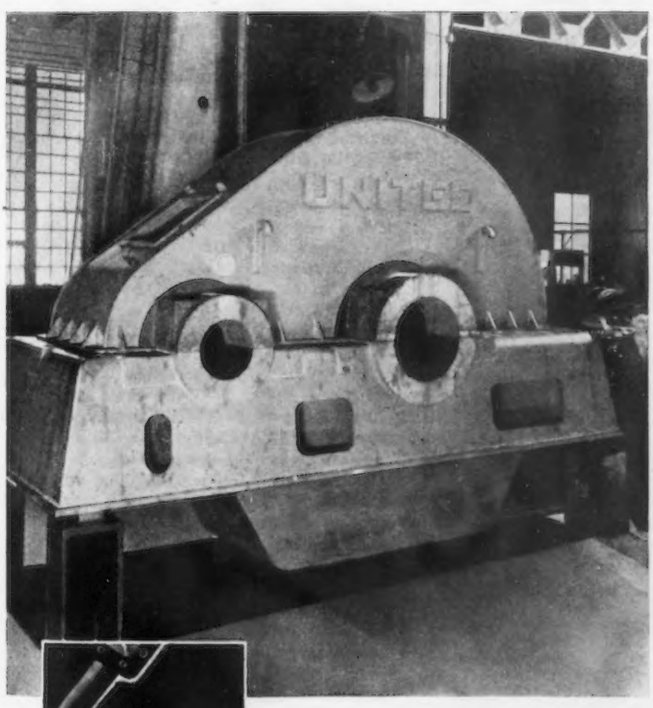
Municipal Council, Johannesburg, South Africa, plans addition to electric generating plant, including generator unit and accessories, 10,000-kw. capacity, transformers and other equipment. Cost about $450,000 with equipment.

Mexican Eagle Oil Co., Mexico City, Mexico, subsidiary of Royal Dutch Shell Co., Ltd., London, England, has let contract to Alco Products, Inc., Dunkirk, N. Y., an interest of American Locomotive Co., for new petroleum cracking machinery for gasoline production at refinery at Tampico, Mexico. Entire expansion will cost close to $1,000,000 with machinery.



INCLUDE *this*

ECONOMY IN YOUR PLAN!



Gear Case Housing for rolling mill for AMERICAN SHEET AND TIN PLATE COMPANY. Welded by the WM. B. POLLOCK COMPANY, YOUNGSTOWN, for UNITED ENGINEERING & FOUNDRY COMPANY.

MANUFACTURER or buyer of machinery . . the use of rolled steel in the welded construction of machinery adds distinct advantages you cannot afford to overlook. For the manufacturer, rolled steel means greater production in less floor space, elimination of pattern expense and delay, lower material inventory, and a uniform material, free from defects and extremely versatile in application. For the buyer, rolled steel offers increased strength, decreased cost and weight, improved appearance, quicker delivery, lower shipping charges. Welded rolled steel is being substituted for cast machine parts of all kinds . . machinery bases, bed plates, frames, housings, pedestals, etc. The great variety of our standard sections will no doubt offer an economical solution of your problems. *Carnegie representatives* will gladly consult with you regarding the use of rolled steel in machine construction.

CARNEGIE STEEL COMPANY

Subsidiary of United States Steel Corporation

PITTSBURGH, PA.

Illinois Manufacturers Fear Spread Of Labor Racketeering

MANUFACTURERS fear that the labor terms introduced in the Industrial Recovery Act at the dictation of the union labor lobby are likely to lead to an era of racketeering, lockouts and wage controversies, according to Gen. T. S. Hammond, president, Illinois Manufacturers' Association.

In a statement issued Saturday, June 10, General Hammond depicted the competition for emoluments, otherwise known as racketeering, already existing in Illinois and elsewhere and likely to be greatly increased if the American Federation of Labor carries out the expressed intention of its president to unionize all labor.

"Such racketeering," said General Hammond, "based upon the attempts of one union to usurp the rich emoluments of another union is even now engaging the attention of the state's attorney of Cook County, the mayor of Chicago, and the Illinois general assembly. The necessity for transportation by motor truck renders employers particularly vulnerab e to any interference with the vehicular movement.

"There is a regular union of teamsters and an irregular or outlaw combination of husky chauffeurs and their helpers. The Trucking and Transportation exchange is known as the T. N. T., and its activities to control the profitable pickings that may be obtained from susceptible employers, including the city of Chicago, has caused the state's attorney and the mayor to use force to prevent assemblages of the out'aws. Special legislation is now being asked of the Illinois general assembly to remedy the situation if possible.

"For nearly a year companies of the Illinois National Guard have been, and still are, on duty in the principal coal mining districts of Illinois. There is no question of wages, I am informed, nor of working conditions, but simply a controversy between two unions of coal miners as to which shall have the right to collect dues. Fifteen persons have been killed as a result of the factional warfare."

Spectrographic Analysis To Be Discussed

The advantages and possibilities of the spectrograph in qualitative and quantitative analysis, in testing and in research, will be discussed at a "Round-Table" conference on June 29 at the Stevens, Chicago, during the annual meeting of the American Society for Testing Materials.

The following four main topics will be discussed under the leadership of technologists who are pioneering in this work: *Spectrographic Instrumentation*—T. A. Wright, technical director and secretary, Lucius Pitkin, Inc.; *Accessory Uses of the Spectrograph*—C. C. Nitchie, Bausch & Lomb Optical Co.; *Methods of Quantitative Spectrography* — O. S. Duffendack, University of Michigan; *Practical Application of the Spectrograph in Metallurgical Research*—H. V. Churchill, Aluminum Co. of America.

National Steel Raises Dividend to 25c.

National Steel Corpn., which has shown earnings throughout the depression, is the first steel producer to increase dividends on common shares. Directors voted to double previous payments of 12½c., making the new dividend 25c. a share, to be disbursed June 30 on stock of record June 20.

In announcing the change, Ernest T. Weir, chairman of the board, stated that the company "has no obligation or back payments carried over from the depression period and consequently is in a position to share current earnings increases with stockholders. The increase in net earnings so far in the second quarter amply justifies the increased dividend as declared. The company is in an excellent financial position, with cash holdings the largest in history. In addition, all sinking fund requirements due Oct. 1 under its 5 per cent bond issue and a large part of those due Oct. 1, 1934, have already been taken care of."

TWENTY-ONE pounds of aluminum beer barrel and fifty-five pounds of boy form the interesting combination shown below. The container is of the half-barrel size, holding 15½ gallons. It is 22 in. long and about 17 in. in diameter. Aluminum Co. of America built it at its New Kensington (Pa.) works for use in an eastern brewery.

Loans Authorized by R. F. C.

WASHINGTON, June 13.—The Reconstruction Finance Corpn. has authorized the following loans for use in connection with self-liquidating projects:

To United Rehabilitation Corpn., Los Angeles, additional commitment of $500,000 to be used in reconstruction of buildings damaged by earthquakes.

To Southeastern Merchandise Market, Inc., Charlotte, N. C., $175,000 for construction of central market for display of textiles and associated products. Building material will cost $106,000.

To Bedford, Ohio, $133,000 for construction of sewage disposal plant, including screen and grit chamber, settling tanks, separate sludge digestion tanks, sludge beds, administration and screen buildings, pumping plant and distribution mains. Materials will cost $67,300.

To Ambridge, Pa., $100,000 for construction of filtration, water softening and pumping plant. Materials will cost $60,000.

To Arkansas Polytechnic College, Russellville, Ark., $82,000 for use in remodeling three existing dormitories.

To Herington, Kans., $65,000 for construction of sewage treatment plant.

To Angola, Ind., $60,000 for construction of sewage disposal plant. Materials to cost $30,000.

To Reeves County Water Improvement District, Balmorhea, Tex., $20,000 for repairs to irrigation system.

To Berryville, Ark., $25,000 for waterworks system. Will require about 20 carloads of pipe.

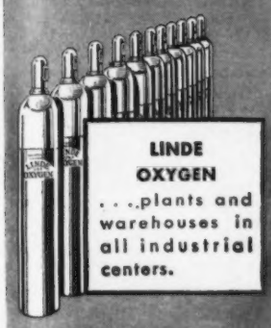
To Toyah, Tex., $23,500 for water distribution system. Materials will cost about $18,000.

To Dallas County Arcadia Fresh Water District No. 1, Dallas, Tex., $8,500 to replace part of distribution system with new cast iron pipe and to extend mains.

To Crowell Independent School District, Crowell, Tex., $3,000 to be applied on construction of high school gynasium, costing $5,000.

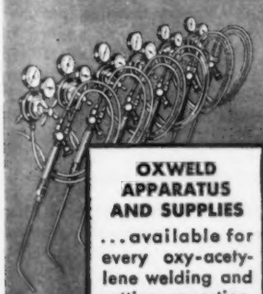
To Yoakum Independent School District, Yoakum, Tex., $500 to purchase machinery for canning factory.

EVERYTHING FOR
OXY-ACETYLENE
WELDING & CUTTING



LINDE OXYGEN
. . . plants and warehouses in all industrial centers.

PREST-O-LITE ACETYLENE
. . . the standard for well over a quarter of a century.



OXWELD APPARATUS AND SUPPLIES
. . . available for every oxy-acetylene welding and cutting operation.

UNION CARBIDE
. . . sold in the familiar Blue and Grey drum from over 250 warehouse stocks.

Bronze-Welding Increases Return on Maintenance Dollars

Power Plant Saves Dismantling

In a hydro-electric plant, ice broke out sections of the vanes of a turbine. Replacement, including dismantling, was estimated at $900. Repair by bronze-welding was done without dismantling and cost only $225. The unit was out of service less than 25 per cent of the time required for installation of new vanes. Case No. 3154**

Bronze-Welding Prevents a Shutdown

A sugar refinery depended on a single steam engine for primary power. The frame yoke cracked through the flange from the bottom upward along both sides and extending around two-thirds of the circumference. Replacement cost was $1,600 for a new yoke plus $900 for installation. A service operator advised bronze-welding without dismantling. Two welders, working simultaneously, completed the job in 8 hours. A shutdown was avoided.
Case No. 2978**

Frame Bronze-Welded in Place

A brick-press frame developed a 36-in. fracture through 1¼-in. cast iron. Replacement would involve a special casting at $1000, delivery in three weeks. A service operator recommended repair by bronze-welding in place. The job was completed in four hours. The frame was then better able to withstand shock because the bronze weld metal was stronger and more elastic than the original casting.
Case No. 4086**

Reciprocating Parts Rebuilt

A company operating a number of compressors uses bronze-welding for maintaining efficiency. Thirty compressor cylinders have been resurfaced with bronze with an estimated saving of several thousands of dollars . . . A marine company rebuilt four pistons by bronze-welding at a cost of $75 including machining. New pistons would have cost $350 . . . Cost figures in a plant using bronze-welding for several years reveal an average cost of $20 — including machining—for rebuilding pistons, against $45 for new pistons. Case No. 5273**

City Saves $1800

A 36-in. valve improperly installed in a city water main cracked across the bonnet. The fracture extended 18 inches into the valve body. Bronze-welding the crack in place cost less than $200 and saved $1800 on replacement cost. Case No. 2701**

$2000 Casting Saved for $200

In a Middle Western plant, after $2000 had been spent in the manufacture of a pump casting, a large bearing section was broken off. It was restored to full strength and alignment by bronze-welding for less than $200. The only preheating necessary was done with the blowpipe.
Case No. 4195**

Oxweld No. 25 M. Bronze Rod

Increasing use of oxy-acetylene welding with bronze led to the development of Oxweld No. 25 M. Bronze Rod. This rod melts rapidly, flows freely, tins easily and solidifies quickly, combining speed with ease of application. It produces welds in steel plate with tensile strength and ductility about 40 per cent higher than welds made with conventional bronze rods under similar conditions and the strength in shear is even greater. The hardness of welds made with this rod (96 Brinell) makes it especially useful for building up wearing surfaces. The weld metal can be remelted, permitting the same wearing surface to be rebuilt. A complete description of Oxweld No. 25 M. Bronze and other important Oxweld welding rods and fluxes is available in a new booklet, *Oxweld Welding Rod*, now available from any Linde District Office.†

New Literature

The Progress of Bronze-Welding and *The Principles of Bronze-Welding* fully explain correct practices for the application of bronze-welding and the great value of the process as a construction and repair method. These booklets are now available from any Linde District Office.†

**These typical savings may suggest a more aggressive use of bronze-welding in your plant. If you want additional details on these or other money saving applications of Oxwelding refer case numbers to the nearest Linde District Office.
†Copies on request. No obligation.

THE LINDE AIR PRODUCTS COMPANY
Unit of Union Carbide and Carbon Corporation
126 Producing Plants UCC 627 Warehouse Stocks
IN CANADA: DOMINION OXYGEN COMPANY, LTD., TORONTO

District Offices
Atlanta, Baltimore, Birmingham, Boston, Buffalo, Chicago, Cleveland, Denver, Detroit, El Paso, Houston, Indianapolis, Kansas City, Los Angeles, Milwaukee, Minneapolis, New York, Philadelphia, Pittsburgh, St. Louis, Salt Lake City, San Francisco, Seattle, Tulsa

LINDE OXYGEN • PREST-O-LITE ACETYLENE • OXWELD APPARATUS AND SUPPLIES • UNION CARBIDE

TRADE NOTES

Dalmo Mfg. Co., with plant and headquarters in San Francisco, has taken over the exclusive manufacture of Simplex Window products and Kramer flush valves.

Now one of the largest manufacturers of steel specialties of this type in the West, the company will become a leading factor in the national field with the perfection of present plans to increase its operating force and inaugurate an aggressive nation-wide merchandising campaign.

Other products made by the company and sold exclusively through its subsidiary, Dalmo Sales Corpn., include Dalmo room temperature controls and Dalmo gas valves. T. I. Moseley is president of the combined organizations: Sedley S. Stafford, vice-president and treasurer, and A. M. Karstensen, general sales manager. Sales experts recently added include Fred Miller in the valve department, and A. H. Soule in the window department.

Miles Blunt, 600 South Delaware Avenue, Philadelphia, is the Eastern district manager.

—

Worthington Pump & Machinery Corpn. and **Gamon Meter Co.** have consolidated their operations in the manufacture and sale of meters, through the newly organized Worthington-Gamon Meter Co. Sales headquarters for the company have been established at Harrison, N. J. All manufacturing operations, however, will be concentrated in the Gamon plant nearby, in Newark, N. J.

Officers are as follows: E. T. Fishwick, president; G. H. Gleeson, vice-president in charge of sales; J. A. Bonnet, secretary; R. R. Anderson, works manager. These officials were drawn entirely from the Worthington and Gamon organizations.

Complete lines of meters, as previously built by Worthington and Gamon for hot and cold water, beverages, chemicals, oil and grease, in disk, turbine, compound and piston types, will be continued.

—

Republic Steel Corpn. has moved its Buffalo district sales office to 475 Abbott Road. Thomas B. Davies, district sales manager, and his present staff will continue in charge at the new location.

—

Mildon Engineering Co., Inc., has moved to new offices in the Cunard Building at 25 Broadway, New York.

In connection with their furnace and combustion work they have developed a furnace glaze or vitrified coating for refractory walls, primarily intended for their own installations. They are now placing this glaze on the market under the trade name of "Fire-Kote." This does not contain silicate of soda, fuses progressively between 1200 and about 2800 deg. F. and does not refuse or run at much higher temperatures. (It has been tested above 3400 degrees.)

—

Link-Belt Co., Chicago, announces that the purchasing department of the Caldwell-Moore plant has been moved to the company's Pershing Road plant at 300 W. Pershing Road, Chicago, thus combining all purchasing for the two plants, under the supervision of Henry M. Coen, purchasing agent.

—

Allsteel Press Co., 12015 S. Peoria Street, Chicago, manufacturer of the Verson Allsteel line of punch presses, press brakes, dies and metal working machinery, has appointed as exclusive representative in the Pittsburgh district Leonard R. Nourie, Park Building, Pittsburgh, who now offers a complete service to sheet metal working plants.

—

Kearney & Trecker Corpn., 6784 West National Avenue, West Allis, Milwaukee, has reduced its authorized capitalization from $2,500,000 to $1,250,000. The preferred stock remains at 5000 shares of $100 par value, but the common stock of the same par value has been reduced from 25,000 to 12,500 shares.

Bucyrus-Erie Co., South Milwaukee, Wis., has purchased the inventory and entire rights to manufacture and market the line of blast hole, oil and other well drilling machinery developed by the Armstrong Mfg. Co., Waterloo, Iowa. The Armstrong company retains its plant and accounts receivable and payable. George R. Watson, formerly president and chief engineer of the Armstrong company will be associated with the Bucyrus-Erie Co. in charge of its new line of manufacture, to be carried on either at South Milwaukee, Evansville, Ind., or Erie, Pa.

—

International Harvester Co. has declared a quarterly dividend of 15c. per share payable to stockholders of record June 20. The same dividend was paid last quarter, prior to which 30c. quarterly was paid.

—

The Pittsburgh Testing Laboratory announces the removal of its Boston office to 26 Hillside Avenue, Melrose, Mass. Donald L. Macdonald is New England manager.

—

Benjamin Wolff & Co., Chicago, has established New York office and warehouse facilities at 19 Clara Place, Glendale, Long Island. A complete stock of bright coke tin plate will be carried. Charles R. Boden will be in charge.

—

T. L. Smith Co., 2835 North Thirty-second Street, Milwaukee, is in receivership and will be operated entirely separately from its former affiliated companies, National Equipment Corpn., Koehring Co., etc. The receiver was president of the T. L. Smith Co. from 1916 until 1930, and the organization which will be used by him will be composed so far as possible of men who were associated with him while the company was under his management. Working capital has been supplied and every possible effort will be made to rebuild the business to its former place in the industry. The company is in position to service any of its machines now in the field and to fill orders for repair parts and new machines.

—

Iron & Steel Products, Inc., Frank Parker, president, dealer in Railway Equipment and Car Parts, and Iron and Steel, Railway Exchange Building, Chicago, has taken on additional office space due to increase in business, entrance to their suite being Room 657 instead of 655 as heretofore.

—

The Bristol Co., Waterbury, Conn., maker of indicating, recording and controlling instruments, has moved its New York office to 220 East Forty-second Street. C. W. Williamson, district manager, continues in charge.

—

New England Structural Co. has moved its sales engineering office from 38 Chauncy Street, Boston, to its plant at Everett, Mass.

—

Sloss-Sheffield Steel & Iron Co. announces the appointment of Kerchner, Marshall & Co., 1415 Oliver Building, Pittsburgh, as sales agents in the Pittsburgh and Cleveland territories for Sloss pig iron.

The Cleveland office at 627 Union Trust Building will be in charge of Clay P. Hellwig, who for 16 years was connected with Rogers Brown & Crocker Brothers, Inc.

—

Harmer Railway Supply Co., 55 Second Street, Portland, Ore., has been formed by H. P. Harmer, who last year disposed of his interest in Western Steel & Equipment Corpn., Portland, of which he was founder and president. For 14 years prior to 1930, Mr. Harmer was sales representative in southern Washington and Oregon for Pacific Car & Foundry Co.

—

American Steel Warehouse Co., 874 Metropolitan Avenue, Brooklyn, N. Y., has been organized to conduct a steel jobbing business by Fred M. Cole, formerly with A. Thypin, Joseph C. Devereaux, formerly sales manager of the American Steel Export Co., Inc., New York, and Gerald F. Devereaux, heretofore with the American Steel Export Co., Inc.

TRADE PUBLICATIONS

Trent Electric Heating Elements and Units is the title of a circular which has been issued by Harold E. Trent Co., 618 North Fifty-fourth Street, Philadelphia. This describes and illustrates various types of strip heaters manufactured by the company.

—

Reco "Skedoodle" Thermostatic Flashers, describing electrical fittings and units applicable for flashing signs and transparencies, etc., is the title of a circular issued by Reynolds Electric Co., 2650 West Congress Street, Chicago.

—

Whiting Founder, a publication issued by Whiting Corpn., Harvey, Ill., has brought out its spring, 1933, number. Contents of this number include an article on Good Housekeeping in the foundry, the Moore Hot Blast Cupola and other practical titles.

—

Duozinc is the title of a 48 page handbook issued by E. I. DuPont de Nemours & Co., describing an improved plating product and process developed by the company.

The trade name "Duozinc" has been applied to the process, which is designed for the protection of iron and steel from atmospheric corrosion.

In addition to giving a general description of the Duozinc process and the anodes, and pointing out specific advantages and features, the handbook contains comprehensive and detailed information on "the most efficient electrochemical methods of curbing corrosion of steel products."

Among the subjects discussed are: Solution composition, preparation of the plating solution, operating conditions for still plating, operating conditions for barrel plating, function of the bath ingredients, control and maintenance, methods of analysis, cleaning prior to plating, methods of testing coatings, and other phases of plating procedure. Tables, graphs and formulas supplement the text.

—

The Welding of Enduro Stainless Steel Alloys is a booklet being released for distribution by Republic Steel Corpn., Central Alloy Division, Massillon, Ohio. The booklet contains a large fund of comprehensive information on various welding methods as applied to different types of Enduro stainless alloys, including electric arc welding, gas welding, spot and projection welding, seam welding and flash welding. All of the data and recommended methods are the result of extensive research by Enduro welding engineers, both in the laboratory and in commercial welding shops.

—

Superior Diesel Stationary Engines is the title of a circular issued by Superior Engine Co., Springfield, Ohio, illustrating and describing the 7 in. x 9 in. and 9 in. x 12 in. Diesel engines made by that company and having from 3 to 8 cylinders, with capacities from 50 to 350 hp.

—

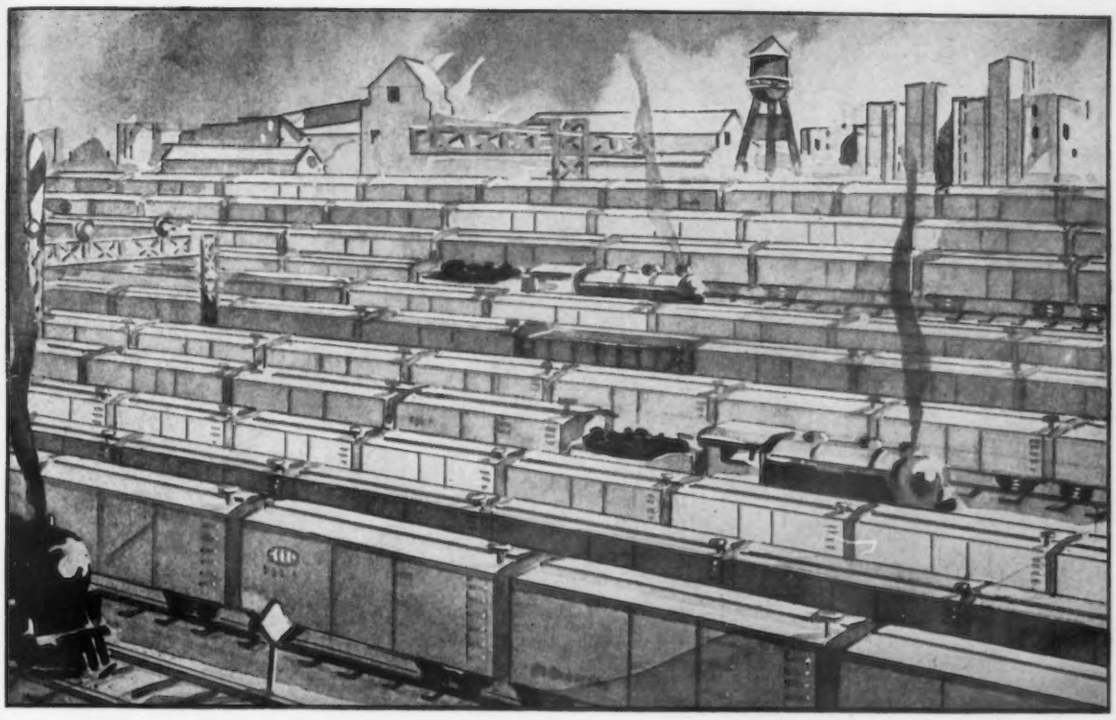
Welded Piping.—Taylor Forge & Pipe Works, P. O. Box 485, Chicago. Eight-page reprint of a paper on "Design Your Welded Piping," presented by F. S. G. Williams of the Taylor company at a joint meeting of the A. W. S. and A. S. M. E. Diagrams, charts, and photographic reproductions are included.

—

Mishawaka Industrial Instrument Mfg. Laboratory, 936 Washington Avenue, Mishawaka, Ind., has issued a circular illustrating and describing its indicating thermoelectric type pyrometers for panel and wall mounting, portable use and multiple point installations.

—

Strapbook has been issued by Acme Steel Co., 2840 Archer Avenue, Chicago. It describes the application and advantages of the steel strapping manufactured by the company for packing and shipping purposes. The booklet introduces the character "Dr. Steelstrap" who will be the central figure in the company's promotional work.



THOUSANDS OF FREIGHT CARS

. . *headed for the* SCRAP HEAP?

DURING the nine-year period of 1922-30, Class I railroads installed 858,982 new freight cars, an average of over 95,442 cars annually.

Then came the depression. Freight car orders numbered only 10,694 in 1931 and less than 1800 in 1932.

Meanwhile rust and obsolescence have been taking their toll. Thousands of freight cars have been stripped to furnish repair parts for others in service.

But the country's population is still growing. Steam roads, moving over 90 per cent of America's freight, remain essential to the nation's life. They must be prepared to take care of these traffic requirements.

The government's plan for solving the problem of the roads, together with the remarkable operating economies already effected, place the roads in a splendid position to benefit from the expanded traffic now materializing.

Improved finances and revived credit will restore the purchasing power of the roads and make possible, sooner or later, orders for much needed new equipment.

For many years the Interlake Iron Corporation has been a supplier of pig iron and foundry coke to manufacturers of railway equipment castings.

INTERLAKE IRON CORPORATION

PIG IRON - COKE

PLANTS—CHICAGO . DULUTH . TOLEDO . ERIE

PICKANDS, MATHER & COMPANY, Sales Agents

CLEVELAND . CHICAGO . DETROIT . ERIE . TOLEDO . MINNEAPOLIS . DULUTH

The Time Is Ripe to Introduce Uniform Foundry Trade Practice

(*Concluded from Page* 952)

received the entire order. Upon investigation, he found that all prices submitted were as agreed but that his competitor allowed terms as follows—bills payable 30 days from receipt of castings—5 per cent off cash—2 per cent off ten days, whereas his own terms had always been "payable fifteenth of month following delivery, no discounts allowed." The buying agent was impartial, as both foundries usually gave equally good quality and service. But in this case one foundry lost out on its due share of the work, whereas if proper trade customs covering the terms had been in force, both foundries would have been benefited and the second set of equipment which had been provided for this work would not have had to remain idle.

There is no end to the many examples of unscrupulous practice, many of them deliberately intended, and of course, others that are not really intended to injure a competitor, but are cases where some one becomes over-zealous in trying to secure an order.

Trade Agreements Needed

The trade agreement practice can be arranged to take care of the unscrupulous buyer who insists that quotations be submitted in writing and who then peddles these prices from one foundry to another, inducing them to cut under one another until neither can make his overhead, saying nothing of the profit to which he is entitled.

The opportunity is now presenting itself when the foundry industry if it is alive to the trend can originate and put into effect such customs and trade practices that will cover every question of competitive marketing and which will in all probability have such persuasive action behind them, that the careless and unscrupulous minorities will be led into line with the great majority of foundry operators whose aim it has been to bring the foundry industry in general to the high plane that it deserves in its relation to the other branches of the metal working field. Let us hope that this branch of industry will not fail to take advantage of the benefits offered by the cooperation of government and industry, through trade associations, for the stabilization of prices and practice. And keep in mind the fact that practices which are sometimes merely sugar coated rebates, have a tremendous bearing on the placement of an order.

No More "Ringing Door Bells" in this Foundry's Sales

(*Concluded from Page* 939)

to its well-planned selling program. R. G. McElwee, general manager, declares that the keystone of its entire business structure is careful planning. He emphasizes that the company "has abandoned entirely the idea of ringing door bells soliciting orders for gray iron." Instead it has picked out those companies with which it desires to do business and has studied their products. Then it has chosen the jobs it wanted to do and launched a vigorous sales campaign to convince the prospect that it could do those jobs better than anyone else. Mr. McElwee terms this policy "sharpshooting in selling castings."

A definite effort has been made to diversify the company's business so that it is not so dependent on the ups and downs of any one industry. Formerly practically all of its orders were from the automobile industry; today a considerable percentage of its production consists of tuyeres for boilers, Diesel engine parts, beer barrel bungs, die casting pots, hydraulic pump castings and electric motor castings.

The management believes that foundrymen can extricate themselves from a difficult position today by selling castings to meet a specified purpose rather than clinging to "hit-or-miss" methods. It is beside the point to attempt to sell gray iron castings because they are gray iron rather than something else. The customer is interested in three factors—whether the castings will meet the requirements of tensile strength, elongation, etc., which the particular product must possess; what kind of delivery can be made; and price. The least of these factors is price, provided that the company demonstrates its ability to manufacture a superior product.

Says Mr. McElwee, "The idea that every buyer is interested in price above every other consideration is a myth which the foundryman has helped build. Even in these days of close examination of production costs, quality counts as much as it always did. We have discovered numerous jobs in which accuracy in making exactly what the customer wants is the most important factor. This means that we must be extremely careful in handling return scrap and in checking all raw materials and must closely control the analysis of our castings. Although exceptional care must be taken, the results are worth while as measured by the number of new customers we have acquired and the cementing of friendships with old customers."

Gas Diffusion Burner System in Forging Work

(*Concluded from Page* 945)

mer does, it is first of all necessary to have scale-free steel. Recent developments in furnace design and burner applications have made it possible to produce scale-free steel. Knowing that this can be done on a commercial basis, it is quite evident that presses and headers can be used to great advantage. In the making of axles, wheel hubs, gears, airplane cylinders, etc., the elimination of scale means a great deal, as further operations, such as pickling, sand blasting and machining, are entirely or at least partly eliminated. Savings on any of these operations will in most cases justify the use of gas as a fuel, even though the cost per million British thermal units may be somewhat higher.

The development and introduction of the recently perfected diffusion combustion burner by Surface Combustion Corpn., Toledo, Ohio, has done much in the advancement of forge shop heating. The "clear flame" type of gas burners as used until recently for high temperature work will heat as fast as the diffusion burner, but will not produce the desired surface condition. Recent installations for billet, slug, bar and tube heating for press and header operations have shown marked improvements.

When using diffusion combustion, the work being heated is enveloped in a blanket or layer of raw gas to protect it from oxidation. A slight back pressure is maintained in the furnace to prevent infiltration of air. Directly above the gas blanket a series of gas and air ports discharge a stream-line stratified flow of gas and air. The air and gas intermix as they travel the length of furnace, burning with a high luminosity and radiating heat into the work. Also, the atmosphere can be controlled to produce some free carbon which deposits on the work, acting as a further preventive against oxidation or the action of carbon monoxide. These burners can be automatically controlled or operated manually.

Diffusion burners have been designed and built giving flame lengths of 6 to 84 ft., although it is theoretically possible to project a flame of over 242 ft. in length.